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China Report

POLITICAL, SOCIOLOGICAL AND MILITARY AFFAIRS

INTRODUCTION TO NATIONAL DEFENSE MODERNIZATION

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POLITICAL, SOCIOLOGICAL AND MILITARY AFFAIRS

INTRODUCTION TO NATIONAL DEFENSE MODERNIZATION

Beijing GUOFANG XIANDAIHUA [NATIONAL DEFENSE MODERNIZATION] in Chinese, Jul 1983 pp 1-36, 198-224

[Table of contents, Editor's foreword and text of chapters 1, 2, 3 and 9]

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[Text] Editor's Foreword

To accelerate the process of making the cadre ranks more revolutionary, younger in average age, better educated, and professionally more competent, the China Science and Technology Publishing House was commissioned by the Propaganda Department and the Organization Department of the CPC Central Committee to organize its forces to edit and publish a set of "Textbooks on Modern Scientific and Technological Knowledge for Cadres," suitable for reading by the broad masses of cadres throughout the country, in order to help them broaden their field of vision, increase their competency, master the necessary knowledge of modernization, and raise their level of leadership and management.

This set of "textbooks" is divided into six volumes: "Agricultural Modernization," "Industrial Modernization," "Science and Technology Modernization," "National Defense Modernization," "Management Modernization," and "Explanation of Modern Scientific and Technological Terms," which were typeset, printed, and published in succession. "National Defense Modernization" was jointly edited and published by the CPLA Fighters Publishing House and the Science Popularization Publishing House. The other five volumes were edited and published by the Science Popularization Publishing House.

National defense modernization is an important component part of the four modernizations, and is also a reliable guarantee for realizing the four modernizations.

The scope that the building of national defense touches upon is very wide. To strengthen their national defense and defend their own territorial sovereignty, all countries adopt a series of important measures in the military, economic, and political fields that relate to defense, like armed forces building, battlefield preparation, national defense industry building, national defense scientific and technological research, and national defense education, all of which fall into the category of national defense building. National defense modernization entails that national defense building possesses a modern, advanced level of science and technology. Its core is to build powerful modernized, regularized and revolutionary armed forces. Broadly speaking, there are three main things in the modernization of the armed forces: 1) there must be people who possess a high degree of political consciousness and advanced military ideas, and who have fairly high scientific and cultural attainments, so that they are able to skillfully master modern weapons and equipment and the means of operating them; 2) there must be excellent weapons and equipment; and 3) there must be a rational integration of people and weapons, and that means a rational scientific establishment and system, and strict training. This book is popular reading matter, and it mainly introduces, from the angle of science and technology, knowledge relating to national defense modernization. In it emphasis is placed on introducing the policies, principles, content, and requirements of our country's national defense modernization; the key points, ways, and measures in the national defense modernization of the developed countries; as well as the level of modernization of the weapons and equipment of the armies, navies, and air forces in the contemporary world. Because of limited space, other questions relating to national defense building will not be introduced.

This book touches on fairly many branches of learning, and its content is broad. To make it suitable for reading by officers and men in the units who have a junior middle school education and by cadres on all fronts throughout the country, we have paid attention to the depth and breadth of the book, and have tried to give prominence to key points and make them easy to understand. All materials and data in the book were taken from openly published publications at home and abroad. In editing it, certain materials and data were handled according to grasp of the situation and our understanding of it.

This book was edited and published with the enthusiastic guidance and vigorous support of many leadership organizations both inside and outside the PLA. The broad masses of cadres inside and outside the PLA also provided many valuable suggestions for editing and revising this book, for which we here thank them and all the the others!

Chapter 1: Modern Warfare and Modern National Defense

National defense and warfare are closely connected. No matter whether it is now or in the future, national defense building must be coordinated in unity with the form of warfare of the times. Now, science and technology are developing with each passing day. Atomic energy, spaceflight technology, electronic technology, as well as laser, infrared, and other results of science and technology, have already been applied to the military domain, causing major changes in weapons and equipment. From the aircraft, tanks, and cannons that were considered advanced weapons in the World War II period, the situation has developed to a new stage represented by guided missiles, nuclear weapons, and electronic technical equipment. The changes in weapons and equipment have also caused changes in the mode of operations, so that new situations and new characteristics have appeared in modern warfare.

In order to better build national defense modernization and make good preparations against a war of aggression, we must understand the forms and characteristics of modern warfare, and understand the demands imposed on national defense building by modern warfare. The Fourth Middle East War in the 1970's, and the British-Argentine War and the Israeli Lebanese War in the 1980's, were modern wars that attracted worldwide attention. The data they provide can give us an initial understanding of the characteristics of modern warfare, as well as the situation in modern land warfare, sea warfare, and electronic warfare.

1. Modern Wars That Attracted Worldwide Attention

On the afternoon of 6 October 1973, close to 2,500 cannons of Egypt and Syria suddenly roared, starting an offensive against Israel (see Figs. 1-1 and 1-2).

A total of 220 Egyptian aircraft penetrated deeply into the Sinai, flying at minimum altitude, and mounted a comprehensive attack on the main Israeli targets, destroying many artillery positions and air-defense guided missile positions and airfields of the Israeli forces. A shock brigade, composed of several hundred soldiers, of the Egyptian Army was airlanded by helicopters in the in-depth areas of the Israeli Army and conducted sabotage and raids on the Israeli Army's supply lines. Under cover of the cannon and aircraft, an Egyptian vanguard, composed of about 8,000 soldiers, swiftly crossed the Suez Canal on rubber attack boats, destroying many Israeli Army tanks and covering the canal-crossing of the follow-up units. The engineers brought up and laid pontoon bridges, insuring the smooth crossing of tanks and other heavy equipment. By the afternoon of 7 October, about 60,000 men and 500 tanks of Egypt had crossed the canal. Naval vessels in the Mediterranean Sea and the Gulf of Suez bombarded the Israeli Army with their guns, supporting with firepower the ground units; at the same time, they supported the army with coordinated action by starting sea battles with the Israeli Navy. In less than 24 hours, the Egyptian Armed Forces broke through the Bar Lev Defense Line, which had been thought to be impregnable. On the northern front, Syria's tank groups and airborne units swiftly seized the Golan Heights. This forced Israeli Premier Meir to implore America: "Save Israel!"

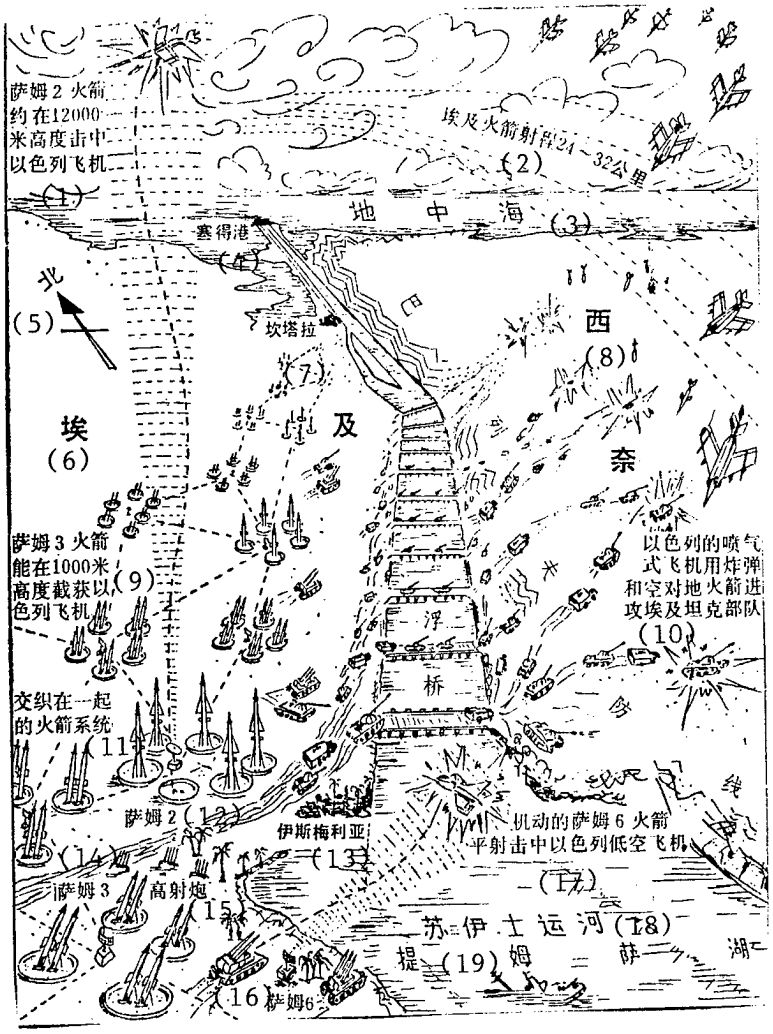

Fig. 1-1 Egyptian Army crosses Suez Canal

Key:

1. Sam-2 rockets hit Israeli aircraft at about 12,000 meters altitude
2. Egyptian rocket range 24-32 kilometers
3. Mediterranean Sea
4. Port Said
5. N
6. Egypt
7. Qantara
8. Sinai
9. Sam-3 rockets able to intercept Israeli aircraft at 1,000 meters altitude
10. Israeli jets attack Egyptian tank units with bombs and air-to-ground rockets
11. Intermingled rocket systems
12. Sam-2's
13. Ismailya
14. Sam-3's
15. antiaircraft guns
16. Sam-6's
17. Mobile Sam-6 rockets hit low-altitude Israeli aircraft with flat fire
18. Suez Canal
19. Lake Timsah

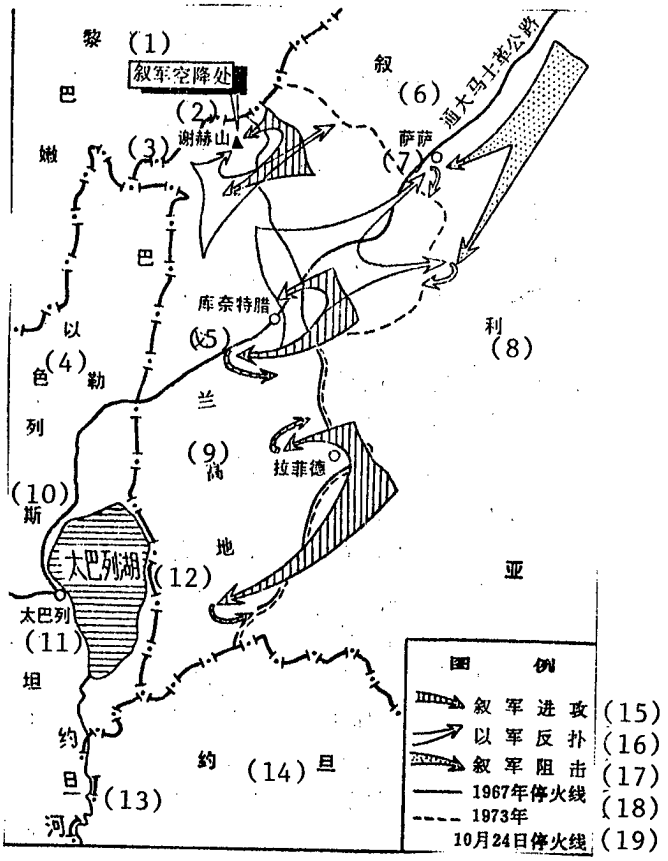

Fig. 1-2 Sketch map of Syrian-Israeli front

Key:

1. Lebanon
2. Syrian airborne landing point
3. Mount Hermon
4. Israel
5. Quneitra
6. road to Damascus
7. Rafid
8. Syria
9. Golan Heights
10. Selap Stine
11. Tiberias
12. Lake Tiberias
13. Jordan River
14. Jordan
15. Syrian Army Offensive
16. Israeli Army counter-offensive
17. Syrian Army's blocking action
18. 1967 cease-fire line
19. 24 October 1973 cease-fire

However, after 1 week, the war situation took a sudden turn and developed rapidly. On 15 October, America's "Big Bird" reconnaissance satellite provided Israel with the intelligence that the point of junction between the Egyptian Second Army and Third Army had not been fortified. Israel at once dispatched an armored advance force to make an in-depth surprise attack. Taking advantage of the enemy's blunder, it suddenly entered Egypt's rear and destroyed many Egyptian air defense missiles and artillery positions, so that Egypt's air defense organization of fire along the canal was paralyzed. It also cut the

Third Army's supply line and line of retreat, putting more than 20,000 Egyptian troops in a difficult position. At the same time, the Israeli Navy used the advanced "(Gabolie)" guided missile in sea battles to sink 13 Egyptian and Syrian guided missile boats, and destroyed the Egyptian and Syrian guided missile air-defense protective screen. Thereupon, Israel turned around the battles it was losing and seized the initiative in the war.

Although this war was only fought in a corner of the Middle East, only three countries were directly engulfed in the flames of war, and it only lasted 18 days, the total military forces thrown into it by the sides were more than 1.1 million men, and more than 1,500 aircraft, more than 5,000 tanks, and more than 200 naval vessels were sent into action. In particular, the battles involving more than 1,000 tanks and the air defense protective screens composed of various kinds of missiles were not seen since World War II.

Eight years after the Fourth Middle East War, in April 1982, Britain and Argentina started a sea and air war around the Malvinas (Falklands) Islands in the South Atlantic that was on the biggest scale since World War II, and that was also the first big naval war in which nuclear submarines, air-to-ship guided missiles, as well as complex electronic systems were employed. In this war, Britain dispatched a task force composed of more than 50 large warships and more than 50 merchant ships, as well as more than 100 operational aircraft. Argentina threw in about a dozen major warships and close to 200 aircraft to meet Britain's attack. Both sides used advanced weapons and equipment, especially several tens of kinds of modernized guided missiles, in carrying out, on the sea, under the sea, in the air, and on island shores, repeated trials of strength in blockades and counter-blockades, air raids and counter-air raids, and landings and resistance to landings. On 2 May, the British nuclear submarine "Conqueror" launched two "Tigerfish" torpedoes, which had advanced guidance and control systems, and sank Argentina's only more than 3,000 ton cruiser, the "General Belgrano." On 4 May, Argentina used the French-made "Super Entendard" fighter to fire, from a distance from the British ships of about 48 kilometers, an "Exocet Am 39" air-to-ship guided missile, which at one blow sunk the British guided missile destroyer "Sheffield," which was highly modernized and was worth $200 million (Fig. 1-3). On 25 May, Argentina again used "Super Entendard" aircraft, which fired two "Exocet" missiles and sank the British "Atlantic Conveyor" troop transport, which had a displacement of 18,000 tons.

The British-Argentina conflict drew the attention of all countries. In particular, the fact that one "exocet" missile, worth 200,000 yuan, had sunk a guided missile destroyer, worth $200 million, left many military personnel dumbstruck, and they cried out in alarm that guided missiles would play a "key role" in future naval warfare. The course of the battles showed that accurate controlled and guided missiles have changed the traditional forms of naval warfare. The two sides did not need to fire at each other with naval guns face to face, but could launch attacks with guided missiles several tens to several hundreds of kilometers away.

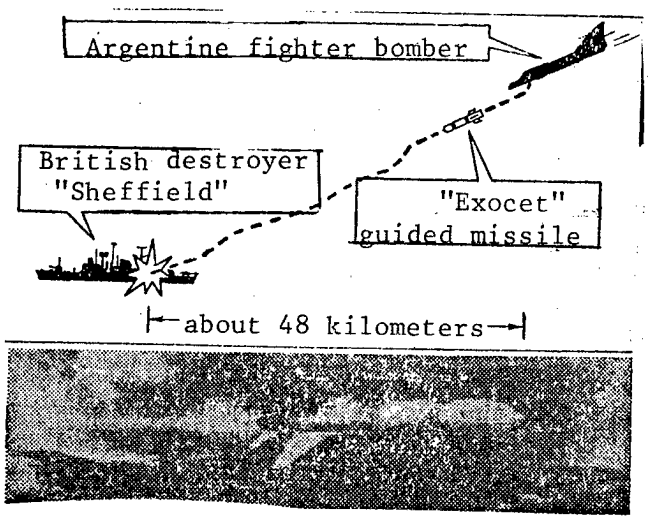

Fig. 1-3 Above, schematic drawing of Argentine Air Force's sinking of British destroyer "Sheffield"
Below, picture of "Exocet AM-39" guided missile flying close to the sea surface

Less than a month after the British-Argentine naval war, on 6 June 1982, there broke out between Israel and the Arabs the biggest war since the "October War" of 1973. The military forces thrown into the war by Israel were a little over 80,000 men in ground units, a little over 1,000 tanks, nearly 300 aircraft, and the greater part of its naval vessels. The military forces thrown into the war by the PLA guerrillas and Syria were more than 60,000 men, a little over 1,000 tanks, 600 armored vehicles, and 570 cannons. On the morning of 6 June, Israel simultaneously dispatched three brigades of about 2,000 men, supported by its Navy and Air Force and split into three columns, across the Israel-Lebanon border to launch a sudden offensive at the Palestinian guerrillas in southern Lebanon. The armored units of the western column of the Israeli forces, in coordination with paratroops and amphibious units, swiftly followed the coastal road north and in only 3 days had advanced to the southern part of Beirut. In coordination with paratroops, the more than two brigades of men in the center column swiftly stormed and captured the joint command post of the PLA guerrillas and Leftwing Moslem armed forces in southern Lebanon, after which they continued their push north. The more than two brigades of men in the eastern column set out from the Golan Heights and wiped out PLA guerrillas along the way, after which they moved north along the two sides of the Bekka Valley, keeping a watch over and pinning down the Syrian forces in the Bekka Valley.

After the Israeli Army had completed, more or less, the splitting and surrounding of the PLA guerrillas in southern Lebanon, Israel on 9 and 10 June concentrated a large group of aircraft to carry out a fierce bombing of the Sam-6 guided missile positions deployed by Syria in the Bekka Valley. Syrian Air Force aircraft took off to intercept the Israeli aircraft, and about 150 aircraft of the two sides took part in the battle. Before the battle began, the Israeli forces first destroyed the radar warning stations in the Syrian border, so that the "Sam-6" guided missile positions and Syria's aircraft lost

advance warning time. At the beginning of the battle, the Israeli side used "Drone" pilotless electronic reconnaissance planes to entice the Syrian side to launch its "Sam-6" guided missiles, immediately breaking the radio frequencies for the control and guidance signals of the guided missiles. Subsequently, the Israeli side conducted strong jamming, causing the "Sam-6" missiles that had already been launched to lose their bearing and self-explode, and causing the missiles that had not yet been launched to lose their attack capability because of the jamming of their control and guidance systems. Afterward, Israeli operational aircraft, using U.S.-made air-to-surface missiles and teleguided bombs to attack missile clusters, and in only 6 minutes destroyed 19 air-defense missile clusters composed of Soviet made "Sam-6" air-defense missile companies, thereby attaining complete air superiority over Lebanon. This blitzkrieg, electronic war, and guided missile war drew even more interest in the world. The strategy and tactics adopted by it--sudden surprise attacks, swift advance, in-depth penetration, encirclement by three columns, and paratroop airdrops and amphibious operations against a large number of coastal cities and towns--have become the focal point of study by military personnel in many countries. What especially caused talk by everybody was the use in this battle of low-altitude air raids and jamming, and the use of a large number of accurate control and guidance weapons, to destroy the Syrian Army's guided missile bases. The Warsaw Treaty countries, which are equipped with a large number of "Sam-6" air-defense guided missiles, were put on tenderhooks.

All of these wars, even if they were local wars and were not big enough to reflect a complete picture of modern warfare, from many aspects, because of the development of weapons and equipment, had many characteristics of modern warfare.

2. Characteristics of Modern Warfare

From the research materials on the Fourth Middle East War, the British-Argentine War, and Israel's war of invasion of Lebanon, we can see that the main characteristics of modern warfare are:

(1) Three-Dimensional Warfare, Combined Arms Warfare, and Total Warfare

So-called three dimensional warfare means that when war breaks out, it is launched on the ground, in the air, and on the sea simultaneously, and there is very little difference between the front and the rear. From a look at the past two world wars, it can be seen that the front and the rear were very clearly defined, and basically it was a case of "the front fights and the rear supports." In a modern war, if it is conducted on a large scale, the scope of three-dimensional warfare will be broader. Intercontinental ballistic missiles, strategic bombers, and guided missile submarines will carry out strategic raids on important targets in depth, kindling the flames of war in the rear area; airborne forces will be paradropped or airlanded in the rear, turning it into a battlefield; with tanks and infantry battle vehicles as the main force, the ground units will start a large-scale offensive in the main strategic direction, and weapons with different ranges will bombard targets in different war zones; aircraft will simultaneously initiate aerial combat at high, middle, low, and minimum altitudes, or attack positional targets; and besides using strategic guided missiles to attack land targets, the navy's air arm,

surface warships, submarines, and sea weapons will engage in combat above, on, and under the sea. The Malvinas Islands naval war was a fairly typical three-dimensional war. From outer space to high altitude and low altitude, from the vast surface of the sea to the silent seabed--all of them became battlefields.

The so-called combined arms warfare developed from the single service arm operation on the small-scale, small-scope arm coordinated operation of the past to the joint operations of all branches and arms on a large scale, of a large scope, and of a complete process. This characteristic can be clearly seen in the Fourth Middle East War. The main reason that the Egyptian Army was able at the time to cross the Suez Canal and break through the Bar Lev Defense Line was that there were fairly well coordinated operations of the branches and service arms--Air Force, Navy, artillery, engineer corps, and armored corps. Now all countries in the world universally stress the display of the total might of all branches and arms in coordinated operations, making the armed forces establishment and battle compositions more combined. A Soviet motorized division is made up of motorized infantry, tank, artillery, engineer, air defense, chemical warfare defense, and signal communications units (fendui). A U.S. Army division is made up not only of the above-mentioned service arm units, but also of air cavalry units (helicopter units). In this way, from large campaigns to small battles, they are all combined operations by all branches and arms.

So-called total warfare means that the war is not only a trial of strength between military forces, but also a strength between all factors relevant to the war--political, economic, scientific and technological, and diplomatic. That is to say, once war breaks out a country must quickly switch all its armed forces from a peacetime footing to a wartime footing, and unify the control, command, and management of all useable manpower and material, so that political, economic, military, scientific, and cultural activities serve the requirements of war, displaying to a high degree the role of the material and spiritual strength of the entire country. War mobilization under modern conditions also requires that the entire country have the capacity to meet sudden emergencies. For example, Israel, which is aggressive by nature, has divided the entire country into mobilization areas. Two reserve brigades are organized in every area, and every brigade is put into the battle alignment of the military district in which it is located, with the military district being directly responsible for training and commanding it. Because its preparatory work for military personnel mobilization is comparatively ample, after the Fourth Middle East War broke out, even though the day was Yom Kippur and people were in synagogues devoutly praying, Israel was still able within 3 days to mobilize 200,000 men, 3 times the original military force, to swiftly go to the front.

(2) Increase in Surprise

Surprise attacks are an important means of getting the initiative in war, especially in its initial stage. Following the development of armed forces' weapons, like the appearance of thermonuclear weapons, guided missile weapons, and electronic computers, the development of space satellite reconnaissance, photoelectric reconnaissance means, the development of camouflage techniques,

automation of command, and so forth, all provide advantageous conditions for surprise attacks and further increase the surprise nature of war, so that modern warfare possesses more of the characteristics of a "blitzkrieg." For example, in the Third Middle East War, before Israel launched its surprise attack on Egypt, it conducted comprehensive and strong jamming of Egypt's radio communications, breaking Egypt's radio communications, putting its radar out of order, and paralyzing its command. Then Israel dispatched a large group of aircraft on raids that demolished a large number of aircraft and air weapons. Coming to the Fourth Middle East War, Egypt and Syria, drawing a lesson from the lost war, vigorously developed advanced reconnaissance and electronic technologies. In the first half hour of their surprise attack, they almost neutralized all of Israel's radio and army radio communications as well as a large part of long-range ground communications, so that the Israeli commanding officers on the ground were unable to direct aircraft to attack targets and the Air Force pilots were unable to request help over the radio from units on the ground. Egypt and Syria successfully carried out their surprise attack.

The use of sophisticated weapons by units, the replacement of conventional weapons, the improvement of means of transport in battle, and the increase in mobility have greatly increased the speed of operational actions. In operational actions, there will be a high degree of surprise and speed; in time, there will be a quick battle to force a quick decision, and the time that a battle will be sustained will be shortened. For example, the flying speed of some operational aircraft is as high as 3 times the speed of sound, and within an extremely short time they can penetrate an enemy country's in-depth areas. In particular, the widespread use of armed helicopters on the modern battlefield to conduct airborne operations strengthens the tactical mobility of units. The U.S. Army estimates that if the Soviet Union launches an offensive against Western Europe, it is very possible that it will be even more of a blitzkrieg than Hitler's offensive against the Soviet Union was. With the mobility of the Soviet armored units, if they do not meet fierce resistance, it is very possible that within 3 days after the start of the war they will have reached the Rhine River and within 20 days the shores of the Atlantic. It can be envisaged that the more science and technology is developed, the more surprise there will be in warfare.

(3) Colossal Expenditures, Burden of Supply Task Increased

Because in modern warfare all kinds of new-type weapons are used, the expenditure is quite alarming. For example, in the Fourth Middle East War, although it lasted only 18 days, the total expenditure by both sides was more than $5 billion. Aircraft losses were about equal to 1 year's losses in World War II. Tank losses were equal to a third of the tanks the NATO countries have on European battlefield. In the first 3 days after the war broke out, the total number of guided missiles was equal to the entire reserve stocks of the NATO countries in Europe. On the Sinai Pennisula, for every kilometer of frontage the Egyptian Army fired every minute 85 antitank missiles, and every cannon of Israel's fired 400 shells every day. By the 7th day of the war, the operational material of the two sides were basically exhausted, and they had to depend on emergency airlifts by the superpowers to keep the war going. For details on the troop casualties and losses in weapons and equipment of the two sides, see the table below.

Category / Country	Troops		Tank Losses	Aircraft losses	Ship losses
	Total number	Casualties			
Israel	400,000	5,000	nearly 1,000	200	30
Egypt	700,000	14,300	2,000	400	24
Total	1,100,000	19,300	3,000	600	59

In the Malvinas Islands war, to provide supplies for its naval task force, Britain monthly cost for hiring merchant ships reached as high as $90 million. In the first 3 days of the war, Argentina caused the British forces to lose several hundreds of millions of U.S. dollars in warships and aircraft. In this war, Britain spent a total of $2.16 billion, an average of $1.2 million an hour and 3 times the initial estimate. Once the naval task force left port, the British pound began to depreciate. Figures close to Mrs Thatcher said: "Britain now understands the frightfulness of modern warfare."

In a future war, especially in its initial stage, the consumption of material will be even greater. In 1 day and night the material consumption of a field group army of the West will be 8,000 tons, and if 2.5-ton trucks are used for transport, more than 3,000 trucks will be needed. Modern warfare not only adds to the burden of the rear area supply task, but also requires the establishment of a dependable rear support system and requires the support of powerful economic forces and highly developed technological capabilities.

(4) Destructiveness Has Greatly Increased

Following the gain in weapon power, the destructiveness of warfare is increasing day by day. In the British-Argentine War, the Britain's destroyer "Sheffield," worth $200 million, was destroyed in the twinkling of an eye; in the Israeli-Syrian war, a Syrian air-defense missile group, composed of 19 "Sam-6" air-defense missile companies, was destroyed within 6 minutes. This is the best illustration. Even more striking, the Bar Lev Defense Line, which Israel had spent 3 years and $240 million in building, in less than 24 hours collapsed like a house of cards under Egypt's cannon fire. In the Iraq-Iran War, after being fought for 2 years, according to Western estimates the bombing of petroleum sites alone caused a loss to industrial cities of more than $60 billion. All of these examples were taken from wars in which only conventional weapons were used; if nuclear weapons had been used, the destructiveness would have been greater. In the latter stage of World War II, on 6 August 1945, America dropped the first atomic bomb, on Hiroshima in Japan, causing a little over 78,000 deaths and destroying a little over 50,000 buildings of all types, and the total range of destruction was 12 square kilometers. At present the nuclear weapons stockpiled by the two superpowers, in number are much more than at that time, in equivalent weight and power are much greater than at that time, and the means of their delivery are more varied and flexible. If they use nuclear weapons to fight a big nuclear war, the destruction created will be incalculable.

(5) Organization and Command Are More Complex

The scale of modern warfare is large. The battlefield has been expanded, more service arms take part in the war, electronic confrontation is fierce, and in particular, after the appearance of guided missile warfare and electronic warfare, the distance at which the two sides will engage in war is longer, and the concept of terrain and surface features has been expanded, so that even the earth's curvature is used for cover. In the Malvinas Islands naval war, the main reason that the air defense radar systems on the British warships were unable to discover Argentina's "Super Entendard" fighter bomber was that the earth's curvature blocked the radar's "line of sight." All of these circumstances have sharply heightened the actual effects and speed of military actions. The division of work in the internal structure of the armed forces is daily becoming more fine, and the scale of combined operations by all branches and arms have grown unprecedentedly. In engaging in war under these circumstances, a myriad changes occur on the battlefield in an instant, and at any time it is possible that an unexpected situation will arise, both requiring that commanders correspondingly improve their organizational capability and that the armed forces set up battlefield automated systems suited to modern weapons and equipment. Currently, some developed countries already use the most advanced electronic transmitting and sensing reconnaissance equipment, automatic data processing equipment, ground and satellite communication equipment, and automated command equipment in the command organizations of their armed forces, so that command systems react flexibly and are able to continue their work in an environment of strong electronic confrontation.

3. Content and Requirements in Building National Defense Modernization

National defense modernization is an important component part of the four modernizations, and is also a powerful guarantee for achieving the four modernizations. In the contemporary world, imperialism, hegemonism, and colonialism are still aggressively expanding, stirring up turmoil and intranquility in the world. Because of the contention between the two superpowers, the danger of a world war is becoming more and more serious. We must defend the motherland's security and territorial integrity and defend the smooth construction of the "four modernizations"; and we must oppose hegemonism and protect world peace, so we cannot but strengthen the building a modernized national defense.

Each country's economic system, politics, and military strategy are different, and the ways, content, key points, and requirements of national defense modernization are also not the same. In the world there is no unified standard or pattern for national defense modernization. Now each country, in accordance with its own situation and the needs of its own military strategy, is developing its own national defense as much as possible in line with modern science and technology. In building national defense modernization, our country cannot blindly imitate America, the Soviet Union, and other developed countries and comprehensively run after them; it also cannot close itself to international intercourse and get bogged down. Proceeding from the actual circumstances of our country, we should take the path of Chinese-style national defense modernization.

There are many parts in the building of national defense modernization, and the most principal one is the strengthening of the building of the People's Liberation Army, building it into a powerful modernized, regularized and revolutionary armed force; at the same time we must vigorously develop national defense scientific research and national defense industry and strengthen the building of the militia. Specifically speaking:

(1) Constantly Improve Weapons and Equipment, and Achieve Their Modernization

The modernization of weapons and equipment is an important indicator of national defense modernization. Currently all countries in the world attach extreme importance to the replacement of weapons and equipment, so that they maintain an advanced technological level. Although our army has already developed from the past state of "millet plus rifles" to the degree of possessing atomic bombs, hydrogen bombs, guided missiles, and other advanced weapons and equipment, there is still a considerable disparity with respect to the needs of a future war against aggression, and we must work hard to improve the existing weapons so that they form a uniform, complete set; at the same time, we must vigorously develop new weapons and equipment, and constantly replace old ones. We must make our army's principal weapons be ones with high precision, big power, fast firing rate, good mobility, and strong resistance to jamming, resistance to radiation, and resistance to damage, and set up a command, control, communications, and information system, which is automated and rational in structure and which passes operational tests, in order to meet the needs of electronic warfare, guided missile warfare and nuclear warfare.

(2) Train Men Who Have a High Degree of Political Consciousness and Military Quality and Who Are at a Certain Scientific and Technological Level

Only if in the modernization of weapons and equipment there is the possibility of combat effectiveness, and the weapons and equipment are closely integrated with men, will the modernization become real combat effectiveness. Therefore, in modern warfare, the human factor is still in first place. However, we must comprehensively understand the human factor. It not only includes man's bravery, awareness, and spirit of sacrifice, but also his intelligence and ability and his mastery and application of science, culture, and technology. In building national defense modernization, we must strengthen political and ideological work and raise the political quality of the armed forces and militia to a new level. At the same time, we must vigorously organize the cadres and fighters to study science, culture, and technology, so that they skillfully master modern weapons and equipment and operational methods. Currently, we must base ourselves on existing equipment, strengthen strategic, tactical, and technical training in people's war under modern conditions, strengthen the specialized training of branches and arms of the service, strengthen the training of headquarters and logistics, and strengthen political education and scientific and cultural studies in order to solve the problem of integrating men with weapons. At the same time, we must conduct good combined training of all branches and arms of the service and improve their capability to conduct combined arms operations.

(3) Reform the Establishment and System, Strengthen the Combined Arms Nature of the Armed Forces

To closely integrate men with weapons, besides conducting strict training, we must organize the armed forces more scientifically and rationally. In the scientific composition of the armed forces, the most important thing is to strengthen the combined arms nature of the armed forces. At present many countries pay a lot of attention to this work. For a fairly long historical period, our army depended on a single service arm to fight a war, mainly the infantry. After the founding of the PRC, we took a second step and independently developed various technical service arms, organizing and setting up the Air Force, Navy, artillery, armored corps, engineer corps, as well as strategic rocket force, but in systems of organization, training, and management we have not yet organically integrated them. With this situation it is very hard to meet the demands of modern warfare. Now we should take a third step, namely, to better enhance the combined arms nature of all branches and arms of the service, and with a revolutionary spirit reform the establishment and system of the armed forces, building our army into a crack body of troops that has highly trained organizations, agile command, fast reaction, good efficiency, and strong combat effectiveness.

Modernization of the armed forces cannot be separated from their regularization. Without regularized education and training and a complete set of regular systems to integrate man and technology into one body with each displaying its proper might, we cannot vanquish a powerful energy and also will not have true modernization. Therefore strengthening the building of our army's regularization is an important component part of national defense modernization, and it must really be grasped tightly and done well.

We must also put into practice in our armed forces a system that combines the field army, local armed forces, and militia, and perfect the reserve system and mobilization system, so that once an enemy encroaches he will be engulfed in the boundless ocean of people's war.

(4) Constantly Study and Develop Strategic Ideas and Operational Principles

A future war against aggression in our country will be a people's war under modern conditions. In the entire system of Mao Zedong's military thought, the epistemology and methodology concerning the view of war and the study and guidance of war, and the idea of people's war and its strategy and tactics, are an important policy for studying and guiding modern warfare, and are the key to solving the problems of modern warfare. We should treasure them and strive to study, uphold, and apply them. However, the specific operational principles and methods among them are the embodiment of the basic tenets and principles of Mao Zedong's military thought, and they will change following changes in historical conditions, and in particular will change following changes in weapons and equipment. Its basic tenets and principles are also being constantly enriched and developed, and we absolutely must not copy indiscriminately the strategic ideas and operational principles of the past, but should, with Mao Zedong's military thought as our guide and with modernized weapons and equipment as our basis, focus on the enemy's equipment establishment and his operational characteristics, study them broadly and deeply, propose strategies and tactics for vanquishing the enemy, and solve new problems in modern warfare.

(5) Strengthen the Building of Modernized Battlefields

In a future war against aggression, we must hold fast to our position and stop the enemy's offensive, so we should have battlefield conditions for long-term hold-fast defense and independent operations. Under modern conditions, in our building of positions, first of all the units must be capable of combat, that is they must be able to fight, conceal, move, and effect uninterrupted command. Being able to conceal means that we must have fortified defense works in which are stationed troops, artillery, and modern weapons to insure that when the enemy mounts a sudden fire attack we will be able to preserve our military strength. Being able to fight means that we must have perfected combat facilities and fire organization so that we are able to fire from all angles of the position. Being able to move means that within the war zone we must possess good communications conditions, so that after a battle breaks out we can swiftly move in many directions. Being able to effect uninterrupted command means that we must have many means of communication and liaison, so as to insure unblocked command. At the same time, we must be able to live, so within the position there must be built grain, ammunition, and water storehouses of considerable capacity; and, within a shallow depth of the main operational direction, there must be built some logistic support bases to insure uninterrupted supply of material, which is expended on such a large scale in modern warfare. Based on the requirements of a future war against aggression, we must build prelaid battlefields well. In particular, we must build well strategic points, key cities, and fortress zones, and build well the prelaid battlefields in the in-depth areas of the important directions, so that there will be supports for fighting and places for concealment, and the capability for defending against atomic, chemical, and biological weapons will be improved in order to adapt operations to conditions of nuclear attacks.

(6) Establish a Perfected System for National Defense Scientific Research and Military Industrial Production

One prominent characteristic of modern warfare is that, with heavy weapons made primary, it is a consecutive, uninterrupted trial of strength between firepower. For the side on defense, the basic mode of operations is, supported by a position, to inflict casualties on the enemy with firepower; for the side on offense to break through the other side's defense, it must carry out fire preparation and, supported by firepower, carry out a fire assault. Therefore, to insure the steady, constant supply of material and ammunition, and the constant replacement and strengthening of weapons and equipment, we must set up a perfected national defense scientific research and military industrial production system, so that research, experiments, production, and equipment utilization are fairly closely integrated and mutually linked. The technological equipment and the products for development, experimentation, and production must not surpass realistic possibilities, and also must combine the needs of operations and the conditions of unit utilization. If one of these three aspects is not suitable, their use in operations will be adversely affected. Therefore, in the building of national defense modernization, we must set up a scientific, perfected national defense scientific research and national defense industry system, strengthen unified leadership, and put into practice scientific division of work and coordination, so that research, experimentation, production, and utilization will be closely linked and supply insured so as to satisfy the needs of modern warfare.

During research and production, we must also abide by the laws of weapon development, and follow in order and advance step by step. We must attach importance to theoretical and basic research, strengthen technological reserves, and make foundation, application, and development one entity to be grasped, so as to maintain the stability and continuity of development and production.

(7) Gradually Make Command Control, Intelligence Reconnaissance, and Communications and Liaison Organic and Automated

In modern warfare, the command, control communications, and intelligence system are a key. On the battlefield of the future, there will be a lot of information, which must at stipulated times be sent to stipulated places. The intelligence collected by the reconnaissance system must also be transmitted at the required time to command organizations and control departments; otherwise, it will lose its effect. On the battlefield of the future, there will be highly advanced weapon systems equipped with processors, and their work cannot be separated from communications. Therefore, we must set up a comprehensive and integrated system of command and control, communication and liaison, intelligence and reconnaissance, the three forming an organic whole and being automated; strengthen their capacity to communicate with each other; and develop high-speed, real-time communication--all in order to improve the efficacy of command at all levels.

(8) Set Up a Strong Civil Defense System

Many countries in the world are now engaging in civil defense and digging tunnels. Before World War II, the Soviet Union began civil defense project construction. America built 2.4 million civil defense shelters, which are able to hold more than half its population. Japan has built civil defense facilities such as underground streets, underground car parks, underground railways, underground power plants, and underground oil depots. This shows that various countries attach importance to civil defense projects. For us, a future war will mainly be one in which we resist the enemy's aggression on our own land, so, in order to fully display the power of people's war, we should even more set up a strong civil defense system.

In brief, our national defense must be based on the new requirements of modern warfare, and we must build it with a definite object in view. That is also to say that we should make these new requirements the basic content of our building of national defense modernization, and gradually and conscientiously implement it, and then we will be able to set up a truly powerful national defense and be able to effectively stop the enemy's acts of aggression, smash the enemy's aggressive plots, and obtain victory in a future war against aggression.

Chapter 2: Policies and Principles of Our Country's Construction of National Defense Modernization

The construction of national defense modernization touches on the domains of politics, economics, military affairs, science and technology. Each country's social system is different, its strategic doctrine is different, and the policies and principles of its construction of national defense modernization are also not the same. We must proceed from the national condition of our country to study and explore policies and principles for the construction of national defense modernization that suit the reality of our country.

1. We Must Persist in Taking Mao Zedong's Military Thought as Our Guide

Mao Zedong military thought is the military theory produced by combining the universal truths of Marxism with the concrete practice of China's revolutionary wars. It not only found for us the special laws of China's revolutionary wars and guided the Chinese people to win great victories in the revolutionary wars, but also profoundly expounded the Marxist view of war and put forward a set of theories, policies, and principles for building the people's armed forces and for waging people's war, as well as the strategy and tactics for people's war. Therefore, Mao Zedong military thought, no matter whether in the past, at present, or in the future, has been, is and will always be the guide for building our army.

Since the founding of the PRC, guided by Mao Zedong military thought, great achievements have been made by our country in national defense construction. As early as on the eve of the founding of the PRC, Comrade Mao Zedong pointed out: "On the foundation of the brave People's Liberation Army, which has passed its test, our people's armed forces must be prepared and developed, and we will not only have a powerful army but also a powerful air force and a powerful navy." After the founding of the PRC, Comrade Mao Zedong, Comrade Zhou Enlai, Comrade Zhu De, and other proletarian revolutionaries of the older generation paid a great deal of attention to the building of the branches and arms of the service. They formulated correct principles, policies, and preparatory plans, and timely solved problems with regard to authorized strength of equipment, personnel allocation, and education and training. For example, they transferred from the Army organic units of entire divisions and regiments, as well as a large group of outstanding cadres and fighters with combat experience, to form the Air Force, Navy, and special arms, developing our army from a single service arm to the combined arms armed force that included the Army, Navy, Air Force, and various service arms.

Following the setting up in succession of branches and arms of the service and the constant replacement of weapons and equipment, what was urgently needed was a large group of cadres who were familiar with modern science and technology and who could organize and command the coordinated operations of all branches and arms of the service, as well as fighters who could skillfully master new weapons and equipment. The Party Central Committee and its Military Commission decided to initiate in the units military and political training and cultural education, and to run academies and schools of various types. In 1952, Comrade Mao Zedong pointed out: "Adaptation to modernized equipment requires regularization in unit building, requires unified command,

unified systems, unified establishment, unified discipline, and unified training, and requires closely coordinated movements by all branches and arms of the service." Based on the directives of the Party Central Committee and Comrade Mao Zedong, our army took a series of major measures and gradually unified the establishment of the entire army. It determined the system of organization of the armed forces and its command relationships; formulated internal regulations, formation regulations, discipline regulations, and many other combat rules and regulations; put into practice the compulsory military service system, cadre pay system, military ranks system, and other major systems; and initiated military and political training and cultural education. Within a few short years, by using a regular pattern, the entire army was unified. There was a very big improvement in the military quality, political consciousness, and scientific and cultural level of the broad masses of cadres and fighters. The building of our army took a big step and began to take the path of modernization and regularization.

However, after Lin Biao became minister of national defense, he regarded the building of modernization and regularization in the armed forces as the bourgeoise military line, and criticized it as formalism and dogmatism; he put military training and political training in opposition to each other, and by all ways and means sabotaged military training. Particularly in the "Great Cultural Revolution" period, he and others chopped off military academies and schools and broke out of so-called conventions, sabotaging even more the building of armed forces modernization. After the "gang of four" was smashed, Comrade Deng Xiaoping led the work of the Military Commission, and with steady steps national defense modernization entered a new historical period. A combined operations exercise of all branches and arms of the service under modern condition, which was held in August and September 1981 at a certain place in North China, demonstrated the new achievements made by our army in courageously forging ahead toward national defense modernization in the new historical period.

In the initial stage after the founding of the PRC, our army's foundation in national defense scientific research and national defense industry was extremely weak. Comrade Mao Zedong clearly pointed out: "To build a modernized national defense, our Army, Air Force, and Navy must have fully mechanized equipment and facilities, and none of this can be separated from complex, specialized techniques." Because Comrade Mao Zedong's directive was resolutely implemented, national defense scientific research and national defense industry attained a steady development, developing and producing cannons, tanks, aircraft, and ships, and improving our army's equipment. In 1957, Comrade Mao Zedong again pointed out: "We are now stronger than we were in the past, and hereafter we must be stronger than we are now. Not only must we have more aircraft and cannon, but also we must have the atomic bomb. In today's world, if we don't want to be bullied by others, we cannot be without this thing." "We must make artificial satellites." We must "make some atomic bombs and hydrogen bombs." To develop a sophisticated national defense industry, Premier Zhou Enlai worked hard, personally presiding over and holding close to a hundred specialized meetings. He personally took an interest in everything, from plans for sophisticated technology undertakings for national defense to the organization and conducting of every test. With the concern of Comrade Mao Zedong, Comrade Zhou Enlai, and other proletarian revolutionaries of the older

generation, our country exploded its first atomic bomb in 1964. Next, one after another, guided missiles, artificial earth satellites, and intercontinental ballistic missiles were successfully developed, and units that could master and use these weapons and pieces of equipment were set up. In this way, not only were conventional weapons constantly improved, but also there was a new development in using sophisticated weapons for self-defense.

Practice has proved that, by upholding Mao Zedong military thought, modernization and regularization efforts in our army can develop swiftly, and national defense scientific research and national defense industry can advance by leaps and bounds, obtaining gratifying results.

When we face a war against aggression in the future, it will still be a war waged under China's specific conditions. This war will still be one in which we use inferior equipment to deal with an enemy who has superior equipment, and one in which we rely on people's war to vanquish the enemy. Even if major changes have occurred in the weapons of both the enemy and ourselves, the ideas about people's war and the studying and tactics of people's war in Mao Zedong military thought are still applicable in operations under modern conditions; the policies and principles concerning army building and the series of directives on preparation against war are still the guide for our army in its current construction of revolutionization, modernization and regularization. For this reason, we need to study Mao Zedong military thought's theory and practice in army building, operations, command, as well as war-preparation training, and we especially need to systematically sum up our army's historical experiences in operational command, and implement and apply the thought in practice. In this way we will certainly be able to give a great impetus to the cause of constructing national defense modernization.

2. The Strategic Policy of Active Defense Must Be Followed

There is a fundamental difference between our country's construction of national defense modernization and the national defense construction of hegemonist and imperialist countries. These countries, in order to contend for world hegemony and achieve their global strategies, stress the development of offensive weapons and vigorously manufacture weapons and their means of delivery needed for oceanic operations, like long-range bombers, intercontinental ballistic missiles, and ballistic missile nuclear submarines, regarding these three kinds of weapons as the three big pillars of their weapons and equipment. At the same time they constantly develop various kinds of tactical aircraft and new-type tanks, and build helicopter carriers. Obviously, they develop military forces to serve their policies of aggressive expansion. Our country is a socialist country, and it will never seek hegemony, never be a superpower, and never mount aggression against other people. Our country's construction of national defense modernization mainly proceeds from the need to resist external aggression and defend our country's security, and it stresses the development of the weapons needed for conducting active defense and people's war. With regard to conventional weapons and special weapons, we make the development of conventional weapons primary. However, to break the nuclear monopoly, we must also develop some nuclear weapons and other sophisticated weapons; with regard to the development of existing weapons and equipment and new-type weapons and equipment, we must first base ourselves on the existing

foundation of weapons and strive to improve them. This principally means to strengthen the existing weapons and equipment, so that they form complete sets, have ample ammunition, and are complete in variety, and to improve their combat performance while developing some new-type weapons.

Based on the demands of a future war against aggression and facing the superiority in armor of the superpowers, we must develop as fast as possible a batch of weapons and equipment suited for active defense, like new-model fighter planes, surface-to-air guided missiles, coastal defense guided missiles, antitank guided missiles, large-caliber antitank cannons, rockets, and land mines; at the same time, we must develop some sophisticated weapons and work hard to raise, within a fairly short period of time, to a fairly high level the modernization of our army's weapons and equipment, in order in a war against agression to effectively wipe out the enemy and win victory in the war.

3. The Demands of People's War Must Be Met

A future war against aggression will be a people's war under modern conditions. Because he will widely use various new-type weapons and equipment, the enemy is bound, under cover of a large part of his air force and in coordination with airborne forces, to use a large number of tanks, infantry battle vehicles, and armored transport vehicles to mount multidirectional, broad frontage, large in-depth, high-speed successive offensives in an attempt to break into our country's hinterland at one stroke and achieve his strategic goal of fighting a war of quick decision. Therefore, we must fully display the entire might of the three-way combination armed forces--field armies, regional forces, and militia--and fight a comprehensive protracted people's war. With the coordinated support of the masses of people, the field armies on the main battlefields, based upon the situation and course of the war, can conduct positional warfare of fortified defense or storming of heavily fortified positions, and can also conduct mobile warfare and by it smash the enemy's sudden surprise attacks, stop the enemy from driving in deep, weaken the enemy's frenzied offensive, and annihilate the enemy's main forces; in their own regions the regional forces will actively coordinate with the field armies, or, in combination with the broad masses of militia and relying on various kinds of defense works and favorable terrain, will apply the various tactics of guerrilla warfare to suppress, delay, and drain the enemy, striking him frequently everywhere. In this way, the three kinds of armed forces--field armies, regional forces, and militia--will be closely integrated, and the three forms of operation--positional warfare, mobile warfare, and guerrilla warfare--will be closely coordinated; on the vast territory of the motherland, there will be spread everywhere a dragnet that will certainly give the enemy blows of an annihilating nature and drown him in the boundless ocean of people's war.

To fully display the might of people's war, we must develop and produce weapons and equipment suited to operations under all conditions. In particular, we must vigorously develop and manufacture various kinds of antitank weapons. Not only must we develop effective operational weapons for the Army, Navy, Air Force, and Strategic Rocket Force, but also we must pay attention to the development of antitank missiles, light antitank cannons, rocket launchers, and antitank mines used by the infantry and the broad masses of militia; and

we must strive to increase their range, improve their accuracy, increase their power, and lighten their weight, while also requiring that they be easy to operate and master.

In a future war against aggression, there will be a myriad changes in the situation in the twinkling of an eye, and the expenditure of manpower and material will be colossal. In the initial stage of the war, the enemy will probably be cut and sealed off, and traffic, command, and communications will probably be cut. Therefore, when setting up the national modernized national defense industrial system, we must correctly handle the relationship between making a unified plan and suiting measures to local conditions; fully display the initiative of the center and each war zone; strengthen the production and stockpiling of war material; and construct strategic rear bases that are each able to fight and guerrilla bases that can conduct guerrilla warfare--all in order to meet the demands of people's war.

In addition, while strengthening the construction of prelaid battlefields, the organization of positions, organization of firepower, and command and supply must suit the requirements of people's war. At the same time, we must pay attention to holding fast to the factories, mines, and enterprises in the fortified zones and to farmland and water conservancy construction, combining the army and the people, combining peacetime and wartime, and having conditions that are beneficial both to production and to the annihilation of the enemy, so that the border defenses, coastal defenses, and interior of the motherland become an impregnable bastion of iron.

4. National Defense Must Be Adapted to Economic Construction

The trial-manufacture and production of the various kinds of weapons and equipment cannot be separated from the close coordination of the departments of metallurgy, petroleum, chemical engineering, electromechanics, light industry, and building materials, and so a powerful national defense must have as its foundation powerful economic forces. Weapon and equipment modernization is an important component part of the construction of national defense modernization. Advanced weapons and equipment are the concentration and synthesization of the new achievements of science and technology, and therefore they are expensive to manufacture. If agriculture and industry do not go forward, and science and technology do not go forward, there will be neither money nor material, and there will also be no science and technology, in which case the achievement of national defense modernization will only be empty talk.

At present, our country is still one which is not very developed in its economy and in its science and technology, and the development of weapons and equipment must be adapted to the levels of the national economy and of science and technology. We must first strengthen national defense construction on the foundation of vigorously developing economic construction. When formulating the development programs and annual plans for weapons and equipment, we must take into consideration the necessary and possible balanced coordination and closely link the programs and plans. This is an important foundation for insuring the stable development of weapons and equipment. Next, the front must not be long, key points must be given prominence, and forces must be concentrated, so that limited manpower and material are concentrated on a small number of key projects,

and then we will be able to obtain positive results. Finally, leadership management must be concentrated and unified, so that scientific management is carried out. We must do good work in demonstrating and proving, appraising and examining development projects; must pay attention to efficiency, strive to save energy, and strive for proportion in costs and efficiency; and must do economic accounting and raise the level of managerial personnel. If we do not take into consideration the country's economic conditions and actual results, and blindly pursue large-scale, high-speed national defense construction, we will inevitably adversely affect the development of the national economy. If economic construction is pounded, national defense construction will become a sandcastle. Therefore, if we want to strengthen the construction of a modernized national defense, we must insure that there is high-speed development of the national economy. Only if economic construction is developed can national defense construction make greater progress.

Our country's national economic construction is now in a readjustment period. Through a certain period of readjusting, restructuring, reorganizing, and upgrading, it will gradually be put on the path of protracted, proportionate high-speed development, insuring that our country's construction of modernization is able to develop forward steadily and surely, thereby laying a solid, dependable foundation for the construction of national defense modernization. In the early 1960's, there was a readjustment of the national economy and the state of economy took a turn for the better, which effectively promoted the development of national defense construction. The atomic bomb and hydrogen bomb were exploded, artificial earth satellites were launched, and the building of the Army, Navy, and Air Force, as well as all the technical service arms, was strengthened. Today, our country is in a much better situation than it was then. The military industry production system is quite solid, the technical forces are abundant, and there has already been marked successes in the economic readjustment. Provided we correctly arrange the relationship between national defense construction and economic construction, the pace of the construction of national defense modernization will certainly be greatly accelerated.

5. Policy of Acting Independently and With the Initiative and of Being Self-Reliant Must Be Upheld

Acting independently and with the initiative and being self-reliant has been the policy consistently upheld by our party, and it absolutely cannot be shaken. National defense modernization must follow this policy, and we must put our feet firmly on the basis of our strength. In the initial stage after the founding of the PRC, we were faced with the shambles left behind by the Kuomintang, as well as the blockade and encirclement by imperialism. Proceeding from our country's reality, and relying on our strategic policy and geographical and economic characteristics, we began, at first by copying, to take out more forces to improve our own weapons and equipment, and finally attained a state of developing them on our own, taking a new way. Particularly after 1960, under extremely difficult circumstances, we displayed the revolutionary spirit of acting independently and with the initiative and being self-reliant, and conquered numerous difficulties, so that there was a very big development in the national economy. From not making motor vehicles we went to making motor vehicles, and at the same time, relying on our own strength, manufactured

aircraft, cannons, tanks, warships, atomic bombs, and hydrogen bombs, launched artificial earth satellites and intercontinental ballistic missiles, and obtained gratifying successes in national defense construction. That today we have a considerable range of national defense scientific research and national defense industry, should be said to be because we began to lay the foundation for it at that time. Of course, our national defense construction cannot be in isolation outside the world; at any time we need to get outside help, and we particularly need to study all advanced things of foreign countries that would be beneficial to us. Various countries of the world have initiated economic interchange and mutually import technologies, and this is an important way to promote the development of their economies and of science and technology. It is a mistake to close a country to international intercourse and to be blindly opposed to everything foreign. However, it is also impossible for a country like ours, with its big territory and armed forces, to depend on buying foreign weapons and equipment to achieve modernization. Even if we could buy them, it is not certain that others would be willing to sell, and at the same time there isn't any one country that would be able to supply us with what we need. Therefore, we should uphold the policy of making self-reliance primary, and on this premise selectively and vigorously import some advanced technologies that we urgently need. In our importation of the results of foreign technology, we must keep in mind raising our level of science and technology, training talents, arousing the enthusiasm of scientists and technicians, encouraging the spirit of going all out to make the country strong, and achieving a combination of the study of foreign countries with our own original creations, so as to promote the construction of national defense modernization so that it more swiftly attains the world's advanced level.

6. Education and Training, Scientific and Cultural Studies Must Be Raised to a Strategic Position

Warfare under modern conditions is three-dimensional warfare carried out jointly by highly modernized service arms. The largeness of its scale, wideness of its battlefields, multiplicity of its application of military force, complexity of weapons and equipment, and difficulty of organization and command have no parallel in past wars. This imposes new demands on commanders and combat personnel. At present, in the units the tactical and technical level, the organization and command capabilities, and the level of science and culture are far from being able to meet the demands of modern warfare. With regard to mastering the use of our army's existing weapons, organizing and conducting combined arms operations, and giving full play to the role of all service arms, there exist many problems. For this reason, we must raise education and training, and study of scientific and cultural knowledge, to a strategic position and truly get a good grip on it. Training must be hard and strict, and proceed from the needs of actual combat; we must train troops in how they will fight in the future. We must base ourselves on existing equipment, strengthen training in the strategy and tactics and the techniques of people's war under modern conditions, strengthen the specialized training of the service arms, strengthen training in headquarters and logistical work, and at the same time do good combined training of all branches and arms of the service, and improve the capability for organizing and commanding combined arms operations.

Making cadre ranks more revolutionary, younger in average age, better educated, and professionally more competent is the policy determined by the Party Central Committee. The Party Central Committee recently decided that, within the next 5 years or so, all cadres working in central party and government organizations at a minimum must have a senior middle school education or a polytechnical school education, and a considerable number must have a college education. Beginning from now, cadres who do not have the stipulated level of education cannot be advanced; cadres who now fall below the stipulated level must, through study and rotational training, attain this level within a time limit. This spirit likewise applies to our armed forces. To quickly raise the scientific and cultural level of our army, the units have taken a series of effective measures, for example, running cadre rotational training classes, in-service study, and sending cadre to academies and schools for advanced studies. Through many forms they train outstanding commanders who master the art of command in modern warfare and various types of specialized talents.

7. Party Leadership Must Be Upheld, and Political and Ideological Work Strengthened

National defense modernization is the great objective of the joint struggle of one entire party, entire army, and people of all nationalities throughout the country. To attain this objective, the party's leadership must certainly be upheld. The entire party, army, and country must be mobilized, and leadership organizations of the party, government, and army at all levels must put national defense construction in an extremely important position, and strive to get a tight and good grip on it.

In upholding the party's leadership, the most fundamental thing is to uphold the party's leadership in the line, principles and policies of Marxism. This is the fundamental principle that must be upheld in strengthening armed forces construction in the new historical period. Now, the Party Central Committee calls on the entire party, entire army, and people of all nationalities throughout the country to struggle hard with one mind and one heart to build a modernized, highly democratic, highly civilized socialist country. We should resolutely implement the line, principles and policies since the 3d Plenary Session of the 11th CPC Central Committee, so that our thinking and action closely follows the party's strategic changes, and in politics we maintain complete unanimity with the Party Central Committee, so as to make new contributions to the construction and defense of the four modernizations.

To strengthen the party's leadership, we persist in making political work the life force of our army, and constantly educate the units in Marxism-Leninism and Mao Zedong Thought. This is the solid foundation for insuring the party's absolute leadership over the armed forces. Under the new historical conditions, we must display the excellent traditions of political work, and get deeply involved in the "four haves," "three stresses," and "two unafraids" activities (four haves: to have ideals, morality, knowledge, and physical strength; three stresses: to stress military bearing, courtesy, and discipline; and two unafraids: to be unafraid of difficulties and hardships, bloody sacrifices), so that every member of our army possesses a high degree of the spirit of self-sacrifice, strict organizational discipline, and revolutionary work style, causing our armed forces not only to become a great wall of steel defending the socialist motherland, but also an important force for building socialist material civilization and spiritual civilization.

Chapter 3: The Focal Points, Ways, and Measures of Advanced Countries in Constructing National Defense Modernization

At present, each of the industrially advanced countries, like America, the Soviet Union, Britain, France, and the Federal Republic of Germany, has its own focal points, ways, and measures of constructing national defense modernization. Introducing their ways of doing things, and analyzing and studying some of their experiences and problems will be of great benefit to our construction of national defense modernization.

1. Focal Points of Construction

During the process of constructing national defense modernization, each country usually puts its focal point on the modernization of weapons and equipment. And the development of weapons and equipment not only depends on the country's economic strength, the level of its science and technology, and the productive capacity of its military industry, but more principally depends on the country's strategic policy and on the mission in war that its armed forces is charged with. By looking at the situation in America and the Soviet Union, we can understand this question.

(1) The Situation in the Soviet Union

According to accounts in the foreign press, since World War II, there have been three big changes in the Soviet Union's military strategy, and each change has imposed different demands on weapons and equipment.

In the Stalinist era (1945-1953), the Soviet Union practiced in its strategy the policy of "strengthening active defense and preventing an enemy invasion," which determined the principle of coordinated operations by all service arms with the Army made primary, and the comprehensive strengthening of its armed forces. In this era, the Soviet Union vigorously strengthened its national defense scientific research and national defense industry, working hard to break America's nuclear monopoly. However, the focal point of its preparations against war was still put on land warfare and conventional weapons. In the Army there was mainly an improvement of the firepower, shock power, and mobility of units at all levels, and an improvement in the capacity of army groups, armies, and units to fulfill independently campaign and tactical missions. The Air Force was separated from the Army system of organization and became an independent service arm, in which Frontal Aviation occupied the principal position, and fighters and light bombers initially became jet-powered. The number of the Navy's operational warships increased, and their mission was limited to offshore defense and to the destruction of the West's oceanic communication lines; at the same time nuclear submarines began to be developed. The Territorial Air-Defense Force and the Airborne Force both became independent service arms. The Territorial Air-Defense Force had under its command the air defense of cities, strategic points, and border areas, and it began to be equipped with air-defense guided missiles.

In the Khrushchev era (1954-1964), nuclear buildup and nuclear blackmail gradually became the theoretical foundation of the Soviet Union's military doctrine. The Khrushchev clique denied the possibility of partial war and conventional

war, and propagated the idea that a future war would be bound to be a world-wide rocket and nuclear war. In strategy, it advocated strategic attack and negated strategic defense, advocating sudden raids and a preemptive war of quick decision; it decided on an operational guiding doctrine based on nuclear rockets and sudden attacks, and abandoned the principle of combined operations by all service arms with the Army made primary. Under this guiding doctrine, the Soviet Union vied desperately for nuclear superiority, vigorously developed all kinds of strategic nuclear weapons, campaign and tactical nuclear weapons, as well as their means of delivery, and set up the Strategic Rocket Force. The role of conventional weapons was depreciated, and their development was also adversely affected to a certain extent.

In the Brezhnev era (from October 1964 to the present), the Soviet Union's internal and external policies changed, and it intensified its contention with America for hegemony on a global scale. In military affairs, it pursued a global offensive strategy with the aim of expansion, made preparations to fight wars of various types and scales, and increasingly paid attention to conventional warfare backed up by nuclear weapons. It stressed sudden attacks and fighting preemptive wars of quick decision, and at the same time made preparations to fight a protracted war. In army building and weapons and equipment development, it gave equal weight to nuclear forces and conventional forces, and strove for overall military superiority over America. The weapons and equipment of all service arms were greatly developed. In the Army, the firepower, shock power, mobility, and protective power of units at all levels doubled and redoubled compared with what they were in the previous era, and the degree of making the units armored was also rapidly raised. The Navy has already developed from an offshore defense naval force to a deep-sea offensive naval force. There have also been big replacements and improvements in the equipment of the Air Force, Air-Defense Force, and Strategic Rocket Force. Now, the conventional strength of the Soviet Union is greater than that of America, and in strategic nuclear strength it is evenly matched with America. In weapon production, it has already greatly surpassed America in quantity, and it has narrowed the gap between it and America in quality.

(2) The Situation in America

According to accounts in the foreign press, since World War II, there have been five different stages in America's military strategy.

In the Truman era (1945-1953), America pursued a "containment strategy," the basic goals and main points of which were: Toward the socialist camp it adopted a policy of "encirclement and containment" and a suppression of the people's revolutionary movement. In military affairs, with World War II as its model, it prepared to launch in Europe a conventional war, with the Soviet Union as the principal object of its operations. Under the guidance of this strategic doctrine, the conventional forces were fully developed, special attention was paid to the means of conventional bombing, and although nuclear weapons were also developed they were mainly tools of blackmail. The outbreak of the Korean War caused this strategy to become bankrupt.

In the Eisenhower era (1953-1961), America pursued a "strategy of massive retaliation." The core doctrine in this strategy was that America could not fight

a conventional war with the heavily populated communist countries and could only wage a nuclear war that relied on its nuclear superiority. Under the guidance of this doctrine, there was a big development of the various kinds of nuclear weapons and their means of delivery. Conventional forces were neglected. In 1957, the Soviet Union's first artificial satellite was put aloft, and it also made intercontinental missiles in advance of America. This fundamentally shook the foundation of this strategy of America's. The vigorous development of the national liberation movement of colonial people also gave no scope to America's nuclear strategy.

In the Kennedy-Johnson era (1961-1969), America pursued a "strategy of flexible response," stressing that "America must have a capability to respond to all possible challenges (from all-out war to infiltration)," and be able "at any place and any time to respond with weapons and units suited to the circumstances" in conducting all-out nuclear warfare, limited warfare, and special warfare. With regard to nuclear warfare, America prepared for nuclear confrontation with the Soviet Union and "mutually assured destruction," and thus it vigorously developed the "triad" nuclear forces of intercontinental missiles, strategic bombers, and nuclear submarines. With regard to conventional warfare, it prepared to wage "two and a half wars" with the Soviet Union, China, and the Third World as the object of its operations. Furthermore, in accordance with this pattern of expanding its units charged with ordinary missions, it built up its armed forces. With regard to its moves in war, it would carry out "gradual escalation of war." Under the guidance of this tactical doctrine, America's nuclear forces and conventional forces were greatly developed, but because it became more and more mired in the Vietnam War it lost its flexibility in strategy and the development of its weapons and equipment were greatly affected.

In the Nixon-Ford-Carter era (1969-1981), America pursued a "strategy of realistic deterrence." Under the signboard of "detente," "dialogue," and "big-nation parity" with the Soviet Union, it drew back its military forces, readjusted their deployment, and redeployed its arms. With regard to nuclear warfare, it put forward the new idea of "limited strategic nuclear war"; with regard to conventional warfare, it replaced the past theory of "two and a half wars" with the theory of "one and a half wars," vigorously cut down on troop quotas, and strengthened the renewal and exchange of weapons and equipment.

In the Reagan era (1981 to the present), America has practiced the strategy of "active confrontation," stressing "realistically countering the Soviet threat" "no matter in what place the Soviet Union endangers U.S. security." On the one hand, it strengthened the building of Army, Navy and the Air Force units with ordinary missions, and prepared at "any one area to conduct any war" in the world to attack the Soviet Union's weak points, and abandoned the theories of "one and a half wars" or "two and a half wars." The reaction in armed forces building and the development of weapons and equipment was to heighten the armed forces' preparations against war, replace nuclear weapons and conventional weapons on a big scale, and strengthen America's power position for direct confrontation with the Soviet Union.

In brief, the arms race between the Soviet Union and America and their development of weapons and equipment cannot be separated from their expansionist

policies and global strategies. In different periods, although the two countries changed their formulation of military strategy, there was not a very big change in the strategic goal, and what was changed was mainly the measures and methods of completing the strategic mission. Now, under the premise of maintaining the number of weapons and equipment and of the armed forces, they are both contending for technological superiority. This contention involves very wide demands and is still continuing.

2. Ways of Development

Since World War II, the construction of national defense modernization in the developed countries has gone through a developmental process from elementary to advanced, from imperfect to fairly perfect. The focal point of construction has been on the modernization of the armed forces' weapons and equipment. However, because of differences in national condition and national power, the paths taken by the countries, the focal points and content of army building, have not been exactly the same. To put it briefly, there are mainly the following two ways.

(1) Independent Development by Relying on the Strength of the Country

America and the Soviet Union were the two main victors in World War II. After the war, on the foundation of building their economies, they depended on the expanded munitions industry of the war and the fairly large military scientific research contingent, as well as on some scientists and technicians, scientific data, and technological equipment they got from Germany, to begin the modernization of their armed forces.

America's industry and its science and technology were comparatively developed, and its economic power was also fairly solid. Making improvement of quality primary, it made a bounding-type development in weapons and equipment in order to insure its technological superiority. In the war the Soviet Union suffered fairly large destruction, and its science and technology were insufficiently developed, so for its weapons and equipment it stressed steady development, following in order and advancing step by step, and seeking quality on the basis of quantity. The Soviet Union has obtained a position of equilibrium with America.

The Soviet Union and America have both developed weapons and equipment on their own initiative. They pay attention to developing nuclear weapons and also conventional weapons, to developing distant-combat weapons and also close-combat weapons. The weapons and equipment form unique systems, each with its own series and characteristics, and they are frequently replaced. They both strive to take the lead in the domain of military technology, and to maintain superiority either in quantity or quality of weapons and equipment. At the same time in the pose of "hegemonies" and with the condition of providing a "nuclear umbrella" and advanced weapons and equipment, they dominate their allies and do their utmost to bring their allies into their own military equipment systems. They take in from their allies certain military technologies, and dump weapons, equipment, and spare parts in some Third World countries in order to grab profits and arms resources. In the present-day world they are the two-biggest "munitions merchants."

(2) In International Cooperation, Equal Stress Is Laid on Self-Initiated Development and on Purchase and Importation

Western European countries have taken a different path than that of the Soviet Union and America. After the war, the national power of Britain and France greatly declined and their position fell; after Germany and Italy were defeated, their economies collapsed, their armed forces were disarmed, their military industry was wrecked, and their munitions production was severely curtailed. With America's economic and military aid, they started to restore their economies and gradually developed their own military industries.

After the NATO bloc was set up, these countries simultaneously depended on America to replace the equipment of their armed forces and displayed their own strong points, manufacturing the weapons and equipment within their power and gradually setting up their own military equipment systems. Either bilaterally or multilaterally, they cooperated to a certain degree, and jointly developed certain technologically complex military equipment like antitank missiles, air-defense missiles, cannons, helicopters, combat aircraft, military rockets and satellites. Some of them, on the basis of developing on their own and using American military equipment, further perfected their own equipment systems and gradually replaced obsolete U.S.-type equipment with equipment made in their own countries. Some of the countries also developed nuclear weapons and set up their own limited nuclear forces. Britain imported technologies from America and set up "Polaris" strategic nuclear submarine missile units, and also prepared to import new missiles for replacements of equipment in its strategic units. France independently developed its own strategic missiles and tactical missiles, and set up its own limited nuclear deterrent force. The Federal Republic of Germany and Italy also possess the means of launching nuclear weapons, but the nuclear weapons are provided by America and their use is controlled by it.

Among the developed countries, Japan started military modernization fairly late, and it has certain specific characteristics. In the early 1950's, the main weapons and equipment of the Japanese armed forces were either given gratis as aid or supplied for payment by America, and Japan was only able to produce some light weapons and equipment and some military material. On the basis of using U.S.-type equipment, and through copying and developing its own military industry and training technological force, Japan gradually raised the rate of the U.S.-type weapons and equipment made by itself. Moreover, on the basis of constantly importing technologies and purchasing weapons and equipment, Japan gradually expanded its development of conventional equipment, such as tanks, armored vehicles, cannons, warships, and aircraft, and substituted them for U.S.-type equipment. However, in order to shorten the development period and reduce development costs, Japan is now still depending on imports for some new-type equipment. By using the method of purchasing to achieve equipment modernization, Japan maintains a level of modernization in its armed forces that is roughly the same as the level of other developed countries. Japan already possesses the capacity to manufacture nuclear weapons and is also able to launch satellites and rockets, but for the time being it has not yet independently developed its own nuclear weapons. Therefore, although the equipment of Japan's armed forces is modernized, its equipment systems are not complete.

3. Principle Measures

(1) Carrying Out Economic Construction in Integration With National Defense Needs

Since the war, the developed countries, on the basis of restoring and developing their economies, have all carried out national defense modernization. In economic construction, they usually take into consideration the needs of national defenses. The basic ways of doing this are:

a. Improving the production and reserves of strategic material. Besides paying attention to the exploitation of natural resources, the developed countries all have strict rules for the variety, specifications, sources, production, purchases, reserves, management, utilization, supplementation, and handling of strategic material, and have issued special laws and decrees for them, in order to insure in peacetime and wartime the urgent needs for military and nonmilitary use.

b. Perfection of the systems of military scientific research and military industry production. The Soviet Union has a planned economy, and through relevant ministries and bureaus the state directly controls military industry enterprises. The military industry is arranged in unified fashion, and the ordinance, ammunition, aviation, shipbuilding, and electronic industries have set up a certain independent production coordinated region and form a complete military industry production system. The expansion, rebuilding, and new building of military industry enterprises are incorporated in the state's capital construction plan, and the production tasks of military industry are assigned by the state in a planned manner. The weapons development and production of Western countries is concentrated in military-civil dual-purpose private enterprises and some official-run military industry factories, which, with the big military industry enterprises as its nucleus, forms a production network for various types of military products.

c. Strengthening preparations for war mobilization of the national economy. The wartime production and mobilization plans formulated by the developed countries stress making good preparations for wartime mobilization, in order to insure that the country at the necessary time will be able to swiftly switch the national economy to the wartime track and expand the production of weapons, equipment, and other military material. They have all made advance preparations in arrangements and technological equipment for switching the civil industry over to the production of military products. There are also clear rules with regard to the scope of commanding, jurisdiction, transportation, and signal communications system, so that the system will be able to serve military purposes and satisfy the armed forces' needs in operational actions.

d. Integrating battlefield construction with economic construction. In industrial layout, exploitation of natural resources and energy sources, setting up of highway and railway networks, laying of oil pipelines, layout of telecommunications facilities, as well as distribution of warehouses and hospitals, the developed countries also take into consideration the needs of national defense and integrate economic construction with battlefield construction.

While engaging in urban construction and improving public facilities, they build shelters and other underground facilities and set up warning networks and firefighting facilities to strengthen civil defense.

(2) Maintaining High Military Expenditure

In increasing their military power and contending for world hegemony, the Soviet Union and America carry out expansion and aggression against other countries, and they constantly increase their military expenditures and go all out in the arms race. The West estimates that in the Soviet Union military expenditures now account for 12-14 percent of the GNP and for 43 percent of the government's financial disbursement, and their annual growth rate is about 6 percent. In 1980, total military expenditures reached $148 billion. In America, the proportion of military expenditures in the GNP was 9.3 percent, the highest, in the Vietnam War era, fell to 5 percent when Carter was in power, and greatly increased after Reagan came to power. In 1980 fiscal year military expenditures were $142.7 billion, and in fiscal year 1983 budget disbursement on military expenditures reached $215.9 billion, maintaining for 5 years an annual growth rate of about 7 percent. By 1986, the budgeted military expenditures will be close to $300 billion. In recent years, the proportion of military expenditures in the GNP of Western European countries has roughly been 3 to 5 percent, and the annual growth rate has been about 3 percent. Because there are fairly many research expenses and purchase expenses for equipment, the weapons and equipment of the armed forces can be constantly replaced.

(3) Widely Initiating Research on Military Strategic Theory

The developed countries also attach comparatively much importance to research on military strategic theory. Taking part in this research are not only leading military and government organizations and high-level research departments, but also many academies and schools inside and outside the army, learned societies, and noted public figures.

The task of research on military strategic theory is: analyze and determine the entire military and political situation and the military strategy; study the ratios of military and political forces on the globe and in various areas and various forms, and their changing circumstances; and study the enemy's strategic focal points, economic capacity, level of development of military technology, and capacity for military industrial production, as well as the enemy's ways of mobilizing and waging war, the direction of his armed forces building, and his war potential. Through comprehensive analysis and study, the task is to determine the general policy for the country's strategy; to formulate the basic principles of military strategy; to put forward specific requirements for armed forces building and war-preparation work; and to make clear the direction, focal points, and basic measures for armed forces modernization. At the same time, the task is to make suggestions for economic construction, military industry production, strategic material reserves, war mobilization, national defense education, as well as civil defense; and to make suggestions for supplementing and revising the relevant laws, decrees, and regulations.

(4) Formulating a Unified Policy for Weapon and Equipment Development

The developed countries attach comparatively much importance to unified weapon and equipment policy, stressing the control by the armed forces of national defense scientific research and weapon development. Their ministries of national defense have set up a set of integrated organizations responsible for national defense scientific research and the formulation of weapon development plans; for research on the direction of the long-term development of weapons and equipment and on equipment model selection; for the formulation of a unified science and technology policy; and for the assurance of interchangeability, seriation, and standardization of weapons and equipment. When deciding on every weapon and piece of equipment, stress is put on conducting full technical and economic demonstrations, implementing the principles of spending less money and getting good quality, and shortening to the minimum the development and production period. They also stress wide-ranging competition in design, price, efficacy, and time in order to get the maximum technological results at the minimum economic cost.

(5) Achieving a Comprehensive Balance in Planning and Management

Besides having comparatively long-term ideas for armed forces modernization, the developed countries have medium-term development goals of 5 or 10 years as well as annual plans. Besides the plan and programs for the entire army, there is a specific plan and program for each service arm and each item of equipment, and each department has its own professional plan. All of these plans are formulated on the basis of coordinated operations by all service arms. In plan management, attention is paid to giving performance to key points and overall balance, stressing a balanced development between all service arms, between combat units, support departments, and service units, between strategic nuclear units, operational theater nuclear units, and conventional units, as well as between all weapon systems. However, there is a very big gap between actual circumstances and plans. For example, pursuing technological superiority produces an imbalance in the various weapon systems.

(6) Timely Readjusting Organizational Forms

To meet the requirements of armed forces modernization and combat, the system of organization and the names of the forms of each country's national defense organizations are constantly readjusted and improved. On the state level some of them set up "national defense conferences," some of them set up "state security commissions," and some set up "general military commissions" or "national defense commissions" as the highest policymaking organizations, which decide the principles, policies, plans, and equipment development networks for armed forces building. The ministries of national defense and each service arm set up corresponding leadership organizations and consultative organizations which are responsible for the building of the entire armed forces and the individual service arm and for the development of weapons and equipment. At the same time, stress is put on strengthening the departments concerned with equipment modernization: the planning and programming departments; the equipment research, design, demonstration, experimental, appraisal, purchase, management, and supply departments; the academic research and training departments; as well as various kinds of support departments. The new departments

of system analysis and computer management have been set up so as to insure that the units are effectively "packaged," equipped and trained. Since the war the combat units of the developed countries have gone through three to four major reorganizations, and among them the proportion of mechanized units and armored units have universally increased.

(7) Attaching Importance to Training of Talents

The higher the degree of armed forces modernization, the more detailed the division of work of military specialties, the more comprehensive and technological in nature they are, and the higher the requirements for specialized talents of all types and the demands for officer and soldier quality. In the 1950's, there were about 1,000 military technical specialties in the Soviet Armed Forces, and by 1978 the number had increased to more than 2,000. The situation in other developed countries is basically the same. To train talents in various military specialties, besides training a large number of military officers in universities and college and advertising for and recruiting in society experts and technical workers, the developed countries run within the armed forces military command academies and schools, and military specialty schools, as well as set up training centers and open postgraduate student classes. Officers and men at all levels must undergo strict military training, technical training, and specialized training. In addition, these countries attach importance to the on-the-job training of active and reserve officers and men as well as nonmilitary personnel within the armed forces, encourage officers and men to study on their own and take academic degree examinations at all levels, stipulate the technical titles or technical grades of all types of personnel, and also set up a strict examination system under which personnel of all types must go through certain training and examinations before they can be promoted. They not only greatly shorten the process by which the armed forces master modern weapons, but at the same time make striking changes in armed forces personnel structure and quality.

1. The proportion of commissioned officers and noncommissioned officers has increased, changing the officer-men ratio. In the Soviet Union the officer-men ratio during the Soviet-German War was 1:37 to 1:40, and it is now 1:5 to 1:6. The officer-men ratio in the U.S. Armed Forces is now 1:6.2.

2. The scientific and cultural level of the officers and men has been raised. In the developed countries, basically all officers have a college education and basically all of the enlisted men have a senior middle school education. In the Soviet Union, by the mid-1970's almost all the commanders at brigade level and above, 90 percent of the regiment commanders, and all of the captains of first-class and second-class warships had received higher military education. A hundred percent of the enlisted men had received middle-level education, and some of them had received higher education. In the U.S. Armed Forces almost all the officers are college students or college graduates, and 89 percent of them have academic degrees. There are also college students and college graduates among the enlisted men, and some of them have obtained B.A., M.A., or Ph.D Degrees.

3. The proportion of engineering and technical personnel has increased. In the mid-1950's, 28.5 percent of the officers in the Soviet armed forces were

engineering and technical officers, and by 1977 this figure had risen to 50 percent. In the Strategic Rocket Force and the Territorial Air-Defense Force, more than 80 percent of the officers were engineering and technical officers. A fourth of the political work officers had the title of engineer. About two-thirds of the enlisted men have mastered specialized techniques. The situation in America and other developed countries is approximately the same. The great majority of the noncombat personnel in the armed forces are also engineering technical personnel and technical workers, and a considerable part of them are scientists with academic degrees or the title of expert, professor, engineer, and economist. Their work efficiency is fairly high, and they play an important role in promoting armed forces modernization. Therefore, strengthening training is regarded abroad as an investment in intellect and the key to armed forces mobilization.

4. Existing Problems

(1) Policy Instability Adversely Affects Armed Forces Building

Within a developed country as well as between each ally there exist various antagonistic political forces. In their view of the political situation and the military strategy situation, and their view of and attitude toward warfare, as well as the direction of armed forces modernization construction and military forces development, there exist very many differences. Between the allies there exist very big differences in judgment of the enemy situation, strategic policy, task division, military force deployment, weapons development, application of military force, and sharing of expenses, and thus there constantly appear a lack of coordination and an instability in policy. This cannot but adversely affect the direction, scale, and rate of armed forces modernization. In the Khrushchev era, the Soviet Union for a time stressed nuclear warfare and total warfare, which caused very big disorder in armed forces building. America exercises a large degree of unified control over military policy and armed forces building, and also frequently makes changes in them. The appeasement policy and pacifist ideological trend of certain countries have also had a certain adverse effect on the building of their armed forces.

(2) Economic Recession Affects Equipment Improvement

In the developed countries there exist sharp contradictions between economic development and national defense construction. The enormous military spending has affected the rate of economic development, and the economic stagnation and inflation have also limited the progress of armed forces modernization. For example, the Soviet Union's actual annual average growth rate in military expenditure over the past several years has been 6 percent, but in the same period the annual average growth rate in national income has only been 3.8 percent. The annual growth rate in military expenditure has greatly exceeded the rate of development of the national economy.

The serious phenomenon of inflation and currency devaluation in the developed countries has caused a universal growth in all expenses of the armed forces. The total cost of seven principal weapons including the XM-1 main battle tank and the M-2 infantry battle vehicle, which the U.S. Army plans to be equipped with before the mid-1980's, was estimated to be $33.57 billion in 1978 and then

calculated to be $41.09 billion in 1981, an increase of $7.52 billion, a very great part of which was created by inflation.

To cope with inflation and maintain the replacement of weapons and equipment, some items of equipment have had to be temporarily shelved, or the time of their being put into production has had to be postponed; some plans have had to be revised or have had their necessary targets lowered; and for some items there have had to be supplementary outlays.

(3) One-Sided Pursuit of Technological Superiority Affects Improvement of Combat Effectiveness

Currently, from starting to be developed to possessing initial operational capability, weapons and equipment normally need about 10 to 15 years, and small weapons need 5 to 6 years. The swift changeover of weapons and equipment is, of course, a good thing, but the one-sided pursuit of technological superiority entails problems in another aspect. For example, in America some weapons become obsolete a few years after the units are equipped with them, and for some weapons there is an excessive number of models so that parts are not interchangeable. Thus, there are fairly many problems in production and utilization. At the same time, the more technologically advanced the weapons and equipment are, the more expensive the price. After the war, the unit price of a fourth-generation tank was 3 to 5 times that of a first-generation tank. The unit price of a fifth-generation combat aircraft was 10 to several 10 times that of a first-generation aircraft. This is bound to add to the economic burden and reduce the quantity of equipment. With too few new-type weapons and equipment, it is not easy to make them truly combat effective, and the discarding of a large number of old weapons and equipment causes a proportionate loss between weapons systems that affects the improvement of combat effectiveness.

Moreover, the one-sided pursuit of technological superiority also entails certain problems for the stockpiling of operational material. According to statistics from abroad, under conditions of modern warfare, the losses in weapons and equipment will be about 5 to 6 times greater than in the past, and the consumption of POL, ammunition, and spare parts will be more than 10 times and even several 10's of times that of the past. Therefore, to wage a war, particularly a fairly large-scale war, there must be comparatively ample reserves of operational material. However, looking at the present situation in the developed countries, we see that the amount of reserves of weapons, equipment, spare parts, ammunition, POL, as well as other military material for the most part is still unable to meet this demand. America's planned number of required tanks is more than 17,000, but it actually has only 10,000; the number of other armored vehicles, cannons, combat aircraft, and the number of ammunition, POL, and spare parts has not yet attained the stipulated index.

With regard to national defense modernization, these ways of doing things by the developed countries have their special natures, but they also have a certain reference value. Based on our country's specific circumstances, we must choose those things that are truly useful to us and reject those things that are useless or harmful, and thus better explore paths for the modernization of our country's national defense.

Chapter 9: Command Automation in the Armed Forces

To adapt to the modernization of the weapons and equipment of the Army, Navy, and Air Force as well as other service arms, automation of the armed forces' command systems is being developed. This is an important part of constructing national defense modernization.

1. Major Changes in Armed Forces Command

For a long time, there has gradually been formed in armed forces command a complete set of working procedures, generally divided into three stages: one stage is to collect intelligence about the enemy side and information relevant to combat (like weather and geography) in order to "know the enemy and know oneself" and "know the weather and know the land"; the second stage is to analyze this intelligence and information, afterward formulating the battle plan and orders by "divising strategies within a command tent"; and the third stage is to transmit the above-mentioned plan and orders to the units and to carry out uninterrupted command in order to "assure victory a thousand li away."

(1) Historical State of Affairs

In ancient times, the completion of the command process depended entirely on people's physical strength and intelligence. The understanding of the enemy situation depended on "scouts" and "spies"; the formulation of the battle plan depended on the individual experience and intelligence of the military commander and his military advisers; and the transmission of battle orders depended on the shuttling back and forth of couriers. Even the supreme commander himself had to lead his men in charging the enemy's lines, or carry out command on the battlefield by having drums beaten and bugles blown. Later, following the increase in the number of men in the armed forces and the appearance of service arms, and following the development of weapons and equipment, in particular the appearance of artillery, the commanding officers could no longer depend on personal front line command for the operations of a large military force, and they were freed from direct participation in combat and engaged in specialized command activities. Even if this was the case, it was hard for their individual intelligence to cope with all the command activities. Therefore, there appeared around them staff personnel to help them in their work, and a specialized command organization was formed--the headquarters. Although the appearance of the headquarters was a big step forward in armed forces command capability, the command process still directly depended on manpower for its completion.

In the World War II period, the command organization expanded day by day, and in carrying out the command process there were weapons and equipment that they could draw on for support, for example, using radar and reconnaissance aircraft to understand the enemy's situation and using wired communications and wireless communications to transmit battle orders, so that the command capability of the armed forces took another big step forward. However, looking at the general situation, operational command in this period was basically still in the form of manual operations.

(2) Requirements of Modern Warfare

With the full-speed development of science and technology, there have occurred major changes in the composition, weapons, and equipment of the armed forces, and it is impossible to depend solely on the form of manpower and manual operations in carrying out command control. Modern warfare imposes higher demands on command.

First of all, the amount of intelligence needed by a commander when making operational decisions has greatly increased. At present, every day more than 1,000 reconnaissance satellites patrol above the earth, searching for all sorts of information pertaining to military activities; reconnaissance aircraft, early-warning aircraft, reconnaissance vehicles, reconnaissance ships, and various types of radar are spread all over the globe to spy constantly upon all movements by armed forces; sonar in the water can make submarines cruising in the depths of the ocean show their true colors; and various kinds of night-vision instruments are able to bring before one's eyes military targets at a certain distance in the boundless and indistinct dark night. It may be said that from outer space to the air, from land (water) surface to underwater, and from daytime to dark night, there is reconnaissance equipment unceasingly collecting military information. They not only extend the eyes and ears of the commanders to thousands upon thousands of li away, but also the quantity of information they obtain is truly astonishing. For example, the U.S. Strategic Air Command needs to process every month on average more than 815,000 pieces of information. That is to say, almost every day it must process more than 26,500 pieces of information. If this is the case in the headquarters of one service arm, it can be imagined what the situation in the General Staff Headquarters is.

Second, the high-speed development of guided missile nuclear weapons not only changed the scale of warfare and broke through the conventional concepts about time and space in war, but also made the changes for people in command and control of weapons more and more complex. For example, 30 minutes after being launched, a present-day intercontinental ballistic missile can hit a target several thousands of kilometers away. From its launch to the ascertaining of its strike result, countless pieces of data need to be calculated, and if they are not possessed in a timely fashion it is difficult to effectively control and command the missile. The required processing by the side that is being attacked is even more complex. A missile is fitted with seven warheads, of which some are true and some false. To intercept an attacking intercontinental ballistic missile, one must first get rid of all sorts of interference and distinguish the true warheads among various "baits" and then command the launching of antimissile weapons that destroy the true attacking warheads. This process includes a large amount of complex operations, and also requires that they be completed within an extremely short time. So, it is absolutely impossible for a commander to rely solely on his own cerebrum to calculate, operate, analyze, and judge and to reach conclusions swiftly.

Third, a modern and a future war will be a three-dimensional war, a total war, and a war of coordinated operations by many service arms. Once the curtain rises on a war, this scene will very probably appear: in space satellites will patrol and watch, in the air aircraft will come and go busily, on the

ground battle vehicles will rush about, at sea warships will cruise about; missiles will soar aloft, and the flames of war will burn everywhere. If the commanders want to take a wide survey of the overall situation in the war, swiftly understand the war situation that goes through innumerable changes in the twinkling of an eye, and timely and accurately command the coordinated movements of all service arms, then it is likewise not feasible for them to depend on their own intelligence and thought.

A common saying is: "Speed is precious in war." What the above-mentioned three points demand is speed, is time, is "rapidity." "Speed is victory" and "time is life." Command organizations, which are the spirit and nerve centers of the armed forces must stress the timeliness and correctness of command, and if their reactions are slow, and they cannot come to correct judgments and conclusions because of being slow, they will certainly passively suffer a blow. However, this "rapidity" that is demanded by modern weapons and modern warfare also cannot be achieved by sole reliance on manpower.

(3) Major Changes

To break free from the restrictions of the human body and to swiftly complete a lot of work that is impossible for manpower to directly complete on its own, and at the same time to free commanders and staff personnel from a large amount of elaborate technical affairs, so that they can put more time and energy on carrying out creative command activities, there had to be a new major change in the method of armed forces command: the development of a comprehensive electronic system with the electronic computer as the leit-motiv, and the close linking of the three basic factors--command, control, and communications--in the modern armed forces command system, using it to help the commanders complete their task during the command process of collecting and processing information, formulating battle plans, and transmitting battle orders, thereby effecting control and command with high efficiency and high quality. The essence of this change was to change the command organizations from bodies composed of people to combined bodies of people and machines. Because in English the first letter in the word command, control, and communications is C, overseas they are abbreviated to the C System. We usually call it the Automated Control System.

At present, all the main militarily strong countries are attaching extreme importance to research on military command automation, and highly appraise its role. Some of them call the realization of command automation the "third military revolution" after nuclear weapons and intercontinental ballistic missiles; some of them think that whether a country has an automated command system is of equal importance with whether it has armed forces. Many countries, particularly America and the Soviet Union, for more than 20 years have invested a large amount of manpower and material, and expended an astonishing amount of funds, on conducting research in this aspect, and have obtained considerable results. For example, since the U.S. Armed Forces began to automate command in 1953, they have spent more than $3 billion on it every year, dividing it into three stages of development: the first stage is to set up separately in some command organizations their own automated command systems; the second stage is to set up in each service arm a unified automated command system; and the third stage is to join the automated command systems of all service

arms into one body, thereby achieving a unified automated command system for the entire armed forces. They have already completed the second stage of development and are preparing to go to the third stage. In the aspect of operational command, they have begun to use these systems for strategic, campaign, and tactical command. For example, the U.S. Global Command and Control System (Fig. 9-1), the command system, which is used by the president, the secretary of defense, and the Joint Chiefs of Staff to command American armed forces around the globe, has been set up in the Pentagon. In it the large electronic computers, with the various kinds of communications equipment bringing together the computers and the command systems distributed over the globe, and with people operating them, the computers are able swiftly to collect, process, store, and replace political and military information in all regions of the globe. The latest information and the information needed by the commanders is timely displayed on large screen displays like motion picture screens for the understanding, analysis, and judgments on situations by the Supreme Command, and on this basis it makes battle decisions and issues battle orders. The role played by this system in the command process is very big, and its efficiency is astonishing. According to reports, only about a dozen seconds are needed from the time a question is presented to a computer and its search and display of the information. The electronic computers there also preserve the overall war plan and many plans in preparation for carrying out operations under various crisis conditions, and are able to carry out necessary calculations and analyses on them, so as to determine which scheme is the optimum action plan for operations at that time. It is said that within one minute this system can send the orders of all its strategic attack forces that are in a state of readiness to the strategic armed troops in various places, and within several minutes can send the orders of the Supreme Command to all U.S. units throughout the globe; through this system the president can at any time communicate with U.S. warships then at sea.

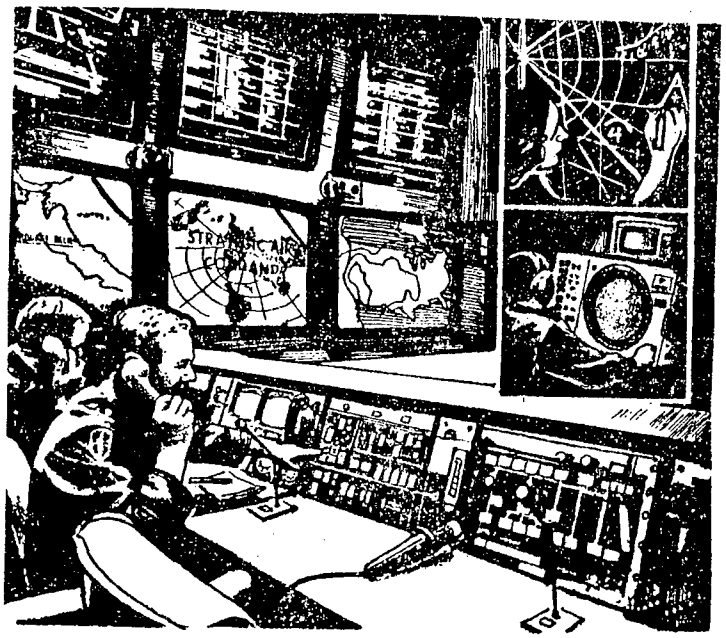

Fig. 9-1. U.S. Global Command and Control System

Moreover, in order to guard against the possibility that the surface command system will be destroyed in a large-scale attack, America has set up a reserve command center underground and a reserve command system aboard aircraft in the air. These reserve command systems have the same function as the command center in the Pentagon.

The Soviet Union claims that its building of command automation "began at almost the same time" as did America's. However, because its electronic technology, particularly its computer technology, is backward, its level of automation is not as high as America's. The automation of the Soviet Armed Forces, divided into the two stages of "partial automation" and "total automation," in the past several years has developed fairly fast. Command automation has now been achieved in its Strategic Rocket Forces and Territorial Air-Defense Force, and in the vast area from Eastern Europe to the Pacific Ocean 1,000 stations have been deployed. To improve the serviceability of the command systems, their equipment has been scattered and reinforced.

While automating strategic command, America and the Soviet Union are reforming the automation of tactical command, so that the change in direction of automation of armed forces command systems has already become a reality, which will have a major effect on future warfare.

2. Composition of Command Systems

An automated command system is a piece of systems engineering that "combines people and machines." People play the dominant, decisive role in it. The machines obey the control of people, and are able to complete a large amount of work that must be done in the command process, but people are also conditioned somewhat by the machines. Only by combining the two can the efficacy of command be highly improved. With regard to the machine aspect, the automated command system is mainly composed of three big parts: the electronic computer, the communications network, and various kinds of information terminals. Even if the scale and size of the automated command systems are not the same, in their functions each has its strong points; the equipment is not completely the same, but in their basic function they bear a little resemblance to a person's nervous system. In an automated command system, the electronic computer is analogous to the "cerebrum," the various types of information terminals are analogoud to the "sense organs," and the communications network can be said to be the "nerves" connecting the two. The electronic computer is the core of the entire system, and under its command, management, and coordination, the entire system works methodically to complete tasks given to it by people, in particular completing work that would be basically impossible for people to complete within a short time.

Below we will separately discuss these three component parts and look at how each one completes its mission.

(1) Electronic Computer

The electronic computer is one of the remarkable achievements of modern science and technology. The electronic computer not only possesses a superb calculating

ability, but also a memory and judgment capacity similar to a human brain, and therefore people also call it the "electronic brain" (Fig. 9-2). No matter what its size, each kind of electronic computer is composed of five parts.

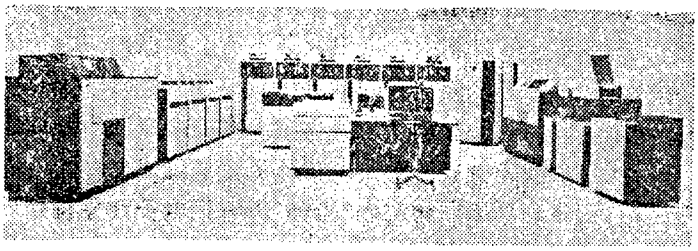

Fig. 9-2.

They are: arithmetic unit, memory, input device, output device, and control unit (Fig. 9-3).

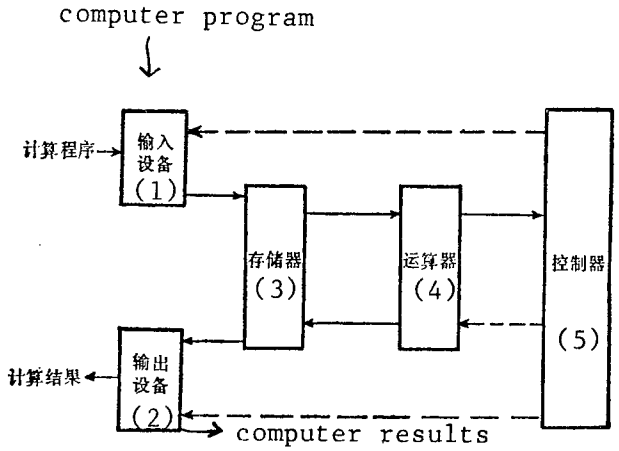

Fig. 9-3. Schematic Diagram of Electronic Computer Components

Key:

1. Input device
2. Output device
3. Memory
4. Arithmetic unit
5. Control unit

The "arithmetic unit" corresponds to a high-speed electronic calculator. It can perform arithmetic operations and make logical judgments. Its operational speed is extremely high, and within a very short time it can complete computational tasks that would take people several years to several tens of years. During operational command, such problems as computation of the flight data of guided missile nuclear weapons, analysis of the information picture of the enemy side obtained by reconnaissance satellites, as well as the formulation of battle action plans, all depend on it for solution by high-speed computation.

The "memory" is like a "gifted scholar" with a photographic memory. It is also like a data bank with a very big storage capacity. It can store thousands and tens of thousands of operational data (like the weapons and equipment, and the unit establishment, of the enemy and us, as well as geographical and meteorological conditions), and can store maps used in operations, and it can also accurately and without error retrieve or file a piece of data in a millionth part of a second or an even shorter time.

The "input device" is the "translator" when the operator is "speaking" with the electronic computer. Through it the command personnel can translate into signals that the computer can "understand" the battle plan that has been drawn up and the relevant orders and information, and put them into the electronic computer for processing or preserving.

The "output device" is the "master" who can write and draw. It takes the reconnaissance information, the situation maps of the enemy and ourselves, and the relevant orders or data, all of which have been processed by the electronic computer, and displays them in words or pictures at the terminals for the command personnel.

The "control unit" is worthy of the title of a "controller," and is the control center of the entire machine. In accordance with the program worked out beforehand by people, it exercises unified control over every part of the machine and coordinates their work in unison.

Because these five parts are things that "see and feel" they are called hard devices--"hardware." However, with this hardware alone, an electronic computer cannot complete its computation work, just as paper and pen, or an abacus, cannot compute by themselves, and it is necessary that the computer have rules of operations. In strict accordance with the "rules" organized beforehand by people, the electronic computer completes its operational tasks step by step and coordinates the work of every area of its parts. These "rules" are called the computer program. Because, in comparison with the electronic computer's equipment, the program "cannot see and feel," it is called "software."

Hardware and software are two sides of the computer that compliment each other. The relationship between them may be likened to that between an abacus and a formula, or that between a piano and a music score. If it is said that the hardware is the computer's body, then the software is its soul, and precisely because it has perfected software for various types and kinds of functions, the electronic computer is able to realize people's wishes and is able to become worthy of the name "electronic brain."

Each service arm in modernized armed forces is equipped with various types of electronic computers, and, besides being used for fire computation, data processing, weapon control, and communication and navigation, they are used to help the commanders in the work of analyzing the posture of the enemy and ourselves, the formulation of battle plans, and the comparison of the superiority and inferiority of battle plans. In one command system, there will probably be many electronic computers and they also will probably be scattered over different areas, but they will jointly complete the tasks of operational command. At present, there are many special-use electronic computers and

microelectronic computers, and for the communications network and information terminals, which we will discuss below, these kinds of electronic computers are used.

(2) Communications Network

All sorts of information about the various service arms scattered in different areas must be reliably and swiftly transmitted to the command center, and the commander's strategic decisions and orders must also be immediately transmitted to his subordinate units. All of this depends for its implementation on the communications network. If communications and liaison are not unimpeded or are severed, then there is bound to be created a paralysis in command. In history the examples of wars being lost because communications and liaison were not working are a common occurrence. Today, when military science and technology are developing at high speed, the demands for quality in communications are even more strict, and in the transmission of information there certainly must not be delays or errors; otherwise, serious consequences will be caused. To reliably do the work of communications and liaison and insure that the command system is unimpeded and unblocked, various advanced means of communication must be adopted. The main means of communication now used by modernized armed forces are:

a. Wire communication. Wire communication is communication that uses conducting wire (electric cables, open wire, and compound wire) optical waveguide fiber and various supplementary equipment to transmit electrical signals. It can deliver telephone messages, telegrams, data, and facimiles. The characteristics of wire communications are good transmission quality, large capacity, and strong security and antijamming capability. It is an important means of communication in modern military operations. However, its construction cost is large, and after being damaged it is difficult to repair in good time. Besides the bare-wire and symmetrical cable communication commonly used in the past, many countries are now using a large amount of coaxial cable communication and are vigorously developing optical waveguide fiber communications.

A coaxial cable has internal conductors and external conductors sheathed in a concentric cylinder shape. Under ideal conditions, electromagnetic waves are limited to delivery between the internal and external conductors. Therefore, when there is a high-frequency transmission, it possesses the merits of small attenuation, good antijamming performance, and broad waveband use. Coaxial cables are used for long-distance communications, and at present the number of telephone calls handled on a pair of coaxial cables can reach as high as 10,800.

Optical waveguide fiber communication is the main direction of development for large-capacity communication. It uses optical waveguide fibers for information channels and transmits information by laser beams. The optical waveguide fibers are like electric signals, only what they transmit are light signals not electric signals. Some merits of laser communication are large information capacity, long amplification distance, good security performance, and no fear of interference, and it saves a lot of nonferrous metals. It can now transmit several thousands of digital telephonic signals. Following progress in research work, it will be able to transmit even more telephonic and television signals.

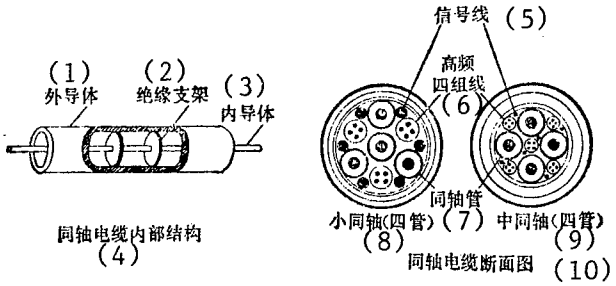

Fig. 9-4. Schematic Diagram of Coaxial Cable

Key:

1. External conductor
2. Insulator holder
3. Internal conductor
4. Internal structure of coaxial cable
5. Signal wire
6. High-frequency four-component line
7. Coaxitrons
8. Small coaxial cable (four coaxitrons)
9. Medium-sized coaxial cable (four coaxitrons)
10. Section of coaxial cable

b. Wireless communication. Wireless communication is a form of communication that uses radio waves to deliver information in the form of sound, written language, and pictures. It can be divided into the following types based on radio wavelength.

	wavelength	frequency
ultra long wave	10-100 kilometers	3-30 kilohertz
long wave	1,000-10,000 meters	30-300 kilohertz
short wave	10-100 meters	3-30 megahertz
ultra short wave	1-10 meters	30-300 megahertz
microwave		1,000-30,000 megahertz

Long wave and ultra long wave communication. It mainly propagates in the form of ground waves, and is an effective means of long-distance communication. Its propagation is more stable than that of short wave, especially under conditions of a nuclear explosion. Also, ultra long wave has a strong capability in permeating sea water and soil, and is particularly suited for communication with submarine under water as well as underground communication. Its demerits are that its emission equipment, especially the emission antenna, is huge, the cost of manufacture is high, and the communication capacity is small, and also it easily suffers interference from static and industry.

Short wave communication. Long-distance short wave communication effects long-distance communication by means of the reflection of electric waves on the ionosphere. Short wave communication channels are fairly simple, and the communication distance is fairly long. However, its reliability and stability are fairly poor, and there occur very big changes in its electric signals following day and night changes and seasonal changes. When there is a nuclear explosion, it would probably be completely broken off; at the same time it is easily jammed by the enemy side.

Ultra short wave communication. By comparison with short wave communication, the propagation of ultra short waves mainly depends on space waves, and therefore it is not affected by day and night changes and by seasonal changes, and it works reliably and with stability; however, it is usually only able to propagate within the apparent distance range, and if it is to be transmitted for fairly large distances relay points must be set up.

Microwave relay communication. It is one of the principal means of radio communication at long distances and has a large to medium-sized capacity. Because microwaves can only propagate in a straight line and the earth's surface has a certain radian, usually there must be set up relay points about 50 kilometers apart, and the microwave is relayed many times like a relay race (Fig. 9-5). Its principal merits are that its directionality is strong and the effect on it of external interference is small; its communication capacity is large, and by comparison with cable communication its construction cost is fairly low. It is suitable for setting up a fixed national defense communication network. But because its antennas are exposed on the surface it is easily destroyed in wartime.

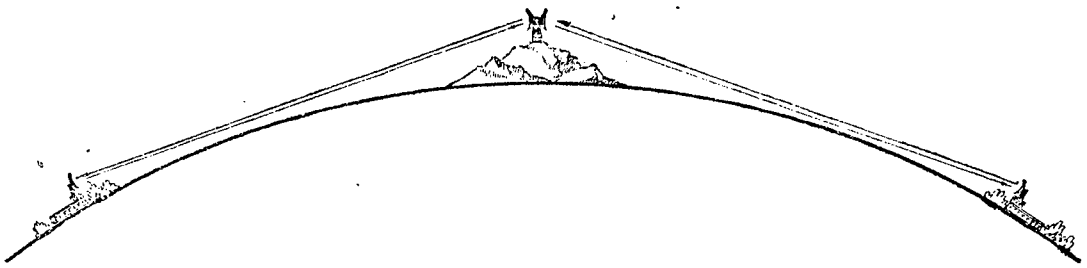

Fig. 9-5.

Scatter communication. It is over-the-horizon communication that makes use of the scatter role of the heterogeneity of the propagation medium. When the electric waves propagated by directional antennas pass through the media of the ionosphere and troposphere, because of the heterogeneity of these media the electric waves scatter and reach to distant places. Scatter communications can be divided into troposphere scatter communication, ionosphere scatter communication, meteor trail scatter communication, and so forth.

For scatter communication, ultra short wave and microwave are usually used. Its characteristics are a fairly good directionality and flexibility, and its communication distances can reach to several hundreds of kilometers and up to a thousand kilometers. But it requires a high-power transmitter, high-sensitive receiver, and high-grain directional antenna.

Satellite communication. This communication is effected by using an artificial earth satellite as a relay point to transmit and reflect radio signals to two or more surface relay points (Fig. 9-7). Its prominent merits are: (1) The communications distance is long. It is able to carry out intercontinental

communication, and if three satellites are used as relays, it can achieve global communication. (2) Its communication capacity is large, and it can transmit several television lines or several thousands of telephone lines. (3) It is able to be flexibly formed into a communication network. Unlike wire communication it is not restricted by lines and has no directionality restrictions; at any place, provided there is no surface station, it can communicate with other places. (4) It is not affected by atmospheric disturbances, and its communication is reliable and stable.

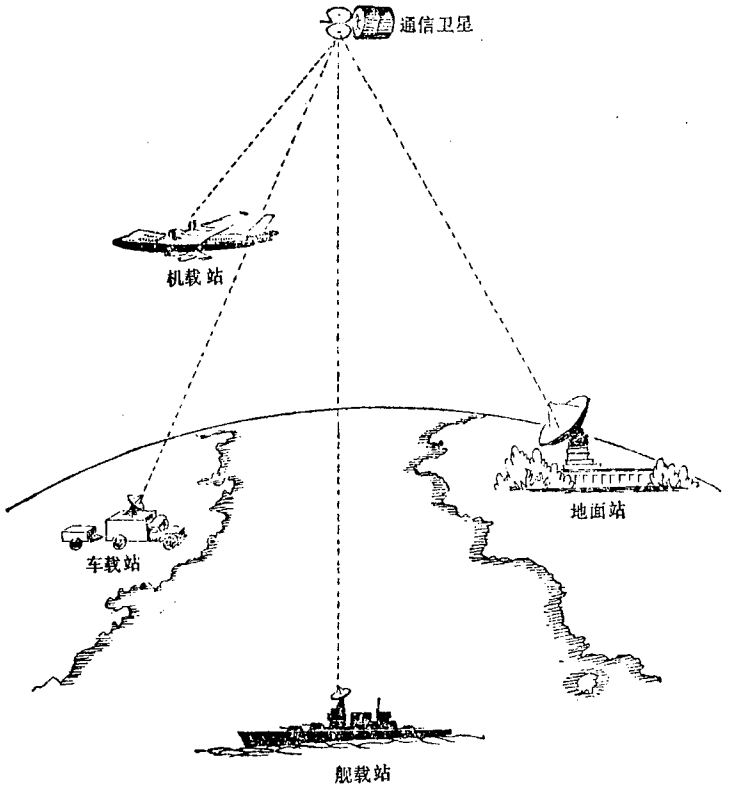

Fig. 9-7.

America's military communication satellites may be divided by use into strategic communication satellites and tactical communication satellites. The strategic communication satellite now in use is the Defense Communications Satellite II, and it is mainly used for strategic long-range relay communication. In November 1971, for the first time two Satellite II's were simultaneously launched into synchronous orbits. The satellite weighs 613 kilograms and has a capacity of 1,300 telephone circuits. The Defense Communications Satellite III, which is now being developed, will be fitted with a new multibeam antenna. Its anti-interference capability will be extremely good, and it will be able both to supply strategic user communications and tactical user communication. The main communication satellite used by the Soviet Union for military command and control is the "Lightning" No 1 system, and the improved "Lightning" No 2 and "Lightning" No 3 systems have been launched. The military ground stations

for "Lightnings" Nos 1 and 2 are deployed in all big headquarters in the entire Soviet Union, and are beginning to be deployed in Eastern Europe.

Looking at the communications content, in modern warfare many graphs and tables need to be transmitted. The telegraph and telephone of the past is unable to meet this need, and picture communication has been developed. What is called picture communication is a form of communication in which picture information--graphs and tables--are turned into electric signals that are transmitted to a receiver, which changes the signals into picture information. Television, picturephone, facsimile, static television, and so forth all belong in the category of picture communication. Its military use is very wide; for example, the transmission of maps of the situation between the enemy and ourselves, as well as reconnaissance, high-altitude survey, air defense, guidance, and tracking, all use picture communication.

Having these advanced communication instruments is not sufficient. The various means of communication of the users, who are scattered in various places, must be joined into a network, and through the network's interchange the communication needed by the users is swiftly and automatically linked up, enabling it to spread in all directions, and communication command is effected flexibly and with facility. The interchange system of the communications network is a little like the crisscrossing intersections in a big city. The streets are built very wide, and several vehicles can run in parallel.

However, if the crisscrossing intersections are not built wide enough or are controlled poorly, there will still be traffic jams and vehicular flow will be blocked. In the past the dependence on manually operated interchange equipment was like a very narrow crisscrossing intersection. Even if one was terribly busy one still could not immediately connect the users who urgently needed to communicate by telephone, and work efficiency was very low. Now, because the electronic computer is applied to the switchboard, the exchange process has become completely automated, and therefore the object of the call can be automatically searched for and found and a route selected that swiftly and accurately links up the parties, thereby greatly improving the utilization ratio of communication lines (Fig. 9-8). Currently, the automatic secure telephone network, automatic telegraph data network, and long-distance telephone network used by modernized armed forces are able to link up all kinds of command posts, join together the electronic computers in various places, and form an integrated command system.

Following the modernization of weapon systems and the effecting of united operational command for the service arms, it was required that the communications and liaison between the units be flexible and mobile, stable and reliable, swift and secure, complex, and multichannel. While developing a strategic communications network, all the main capitalist countries in the West have developed and built in succession automated field and region comprehensive communications networks for use in the tactical and campaign scope, for example: Britain's "Grouse" tactical communication system, France's "(Lida)" automatic comprehensive transmission network, Sweden's field comprehensive system, and so forth. The main pieces of equipment of these communication networks are: moving radio multichannel relay transmission equipment, network control centers,

and model exchange equipment, as well as digital telephones, teleprinters, facsimile machines, data transmitters and other kinds of terminal equipment.

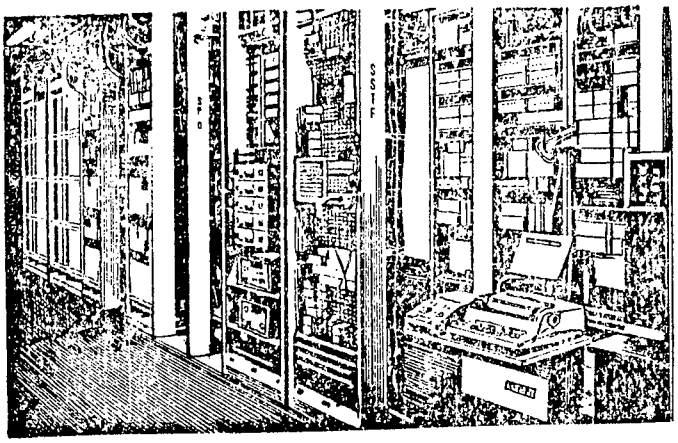

Fig. 9-8.

Most of the frequency bands used by the radio relay equipment of a field comprehensive communication network are between 200 and 1,000 megahertz, and are divided into several working frequency bands, which can simultaneously work in different directions on different frequency bands; or several frequency bands can be used to work simultaneously in the same direction, or be put on standby. Because within this kind of working frequency band there is a considerable number of radio-frequency wave channels, in the multichannel transmission equipment between the network's modes there can be set up within one network several, and even up to a hundred, transmission channels. One mode can have more than six different communications directions, while mutual interference between the channels can be avoided. The performance of these pieces of transmission equipment has been extremely perfected, and they are able to transmit both digital information and analog information. In technology, microprocessor control technology, large-scale integrated circuits, and microband technology are beginning to be put into use. Consequently, the performance is strong, the bulk, weight, and consumption of electricity are fairly small, and the system's reliability and stability is fairly high. The distance between modes is from 25 to 100 kilometers, and, based on wartime needs, they can be flexibly moved and recombined.

(3) Information Terminals

Although electronic computers are infinitely resourceful and can do what people can't, and although communication networks extend in all directions and are flexible and smooth, if there is no advanced equipment for collecting intelligence and information and for automatically executing instructions and orders, and no equipment for the exchange of information between the commander and the computer, then automated command cannot be achieved. This would be like the case of a person having a sound cerebrum and nerves but being blind and deaf and not sound in the four limbs who would be unable to prove equal to a complicated job. We call these pieces of equipment information terminals. There are many kinds of information terminals, roughly divided into two kinds: One

kind is the terminals responsible for collecting intelligence and information, like reconnaissance satellites, reconnaissance aircraft, long-range radar, and so forth. They use various technical means to gather intelligence and information and transmit them to computers, and thus can be called the information source for the command system. The other kind of terminal is the equipment used in the command post for man-machine dialogue, like the Chinese-character intelligence terminal, the picture-processing terminal, and the large screen displayer. Although the roles played by the two kinds of terminals are different, they are the "eyes and ears" and "hands and feet" of the command system. Although some of these information terminals in themselves can be and are extremely complex electronic systems, and also make use of electronic computers themselves, viewed from an overall standpoint, they are still terminals for the command center's electronic computer.

Below we separately introduce several of the principal pieces of terminal equipment.

a. Reconnaissance satellites. Reconnaissance satellites are an important piece of long-range automatic terminal equipment in the automated control system. They do not need manual intervention, and are able to automatically collect various types of strategic information and transmit them automatically to the command center.

There are several kinds of reconnaissance satellites. Based on their different reconnaissance equipment and reconnaissance targets, they are usually divided into photographic reconniassance satellites, electronic reconnaissance satellites, missile advance warning satellites, oceanic monitoring satellites, and nuclear explosion survey satellites. Here we will mainly introduce the photographic reconniassance satellite and the missile advance warning satellite.

Photographic reconniassance satellite. It is a strategic reconnaissance satellite that uses visible light cameras and infrared cameras as the means of remote sensing. In comparison with other means of reconnaissance, it has conspicuous merits: (1) Its reconnaissance area is large. At an altitude of 200 kilometers, it can take a photograph of an area that is more than 40,000 square kilometers (bigger than Taiwan Province), several tens to several hundreds of times bigger than an aerial photograph. (2) It obtains information fast. Every day it can make 16 revolutions around the earth, and can carry out real-time and approximate real-time reconnaissance, and swiftly complete the task of reconnoitering a large area. (3) The results of its reconnaissance are good. It has a strong capability in distinguishing surface objects, and the photographs it obtains are easy to interpret. Also, it is able to conduct reconnaissance both day and night, providing information without interruption. Therefore, most of the satellites launched by various countries are of this kind, and they account for 40 percent of the total number of satellites and 60 percent of the total number of military satellites. To date, the Soviet Union and America have already developed the fourth and fifth generations of this kind of satellite. The great majority of their strategic information comes from this kind of satellite.

After a reconnaissance satellite obtains information, it can swiftly provide the information to surface command centers by several ways: One way is to

swiftly return to the surface on order to the command center. The second way is to use the satellite's automatic equipment to first develop the film and then by using the flying spot scanning method change the negative pictures into electric signals and send them by radio back to the command center. When the command center receives the electric signals, they are processed by the computer and the picture is reproduced. The third way is to use the television camera on board the satellite like a live television relay, and directly change the reconnaissance target into electric signals and send them back to the command center. The fourth way is to eject a film recovery capsule to the surface. America has a photographic reconnaissance satellite named "Big Bird" (Fig. 9-10). The camera it carries takes pictures from an altitude of 180 kilometers. Its resolving power for surface objects can reach 0.3 meters, and it is able to distinguish jeeps and tanks. Its resolving power for line-shaped objects is even higher, and it can distinguish high-tension lines that are two to three inches thick. At intervals of about 2 weeks it ejects a film recovery capsule back to the surface. Many of the true positions of the missile launching sites in the Soviet Union were ascertained by its reconnaissance.

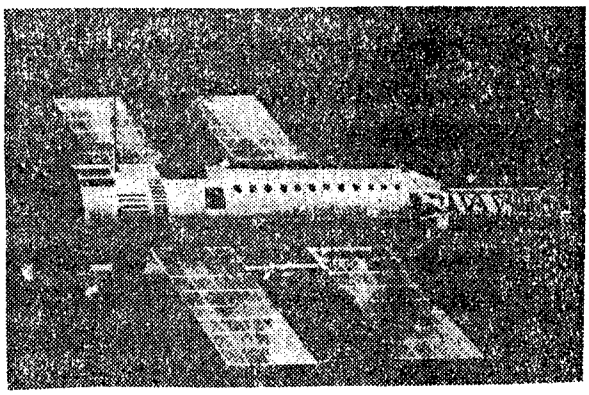

Fig. 9-10.

Besides strategic reconnaissance, photographic reconnaissance satellites are used in parts of an area for tactical reconnaissance. For example, in the India-Pakistan War, the Sino-Soviet border clash, and our war of self-defensive counterattack against Vietnam, the Soviet Union and America launched many satellites to spy and gather information. Especially during the Fourth Middle East War, the Soviet Union launched five reconnaissance satellites, some of which for 4 days in succession passed over the Middle East area monitoring the progress of battle.

Missile advance warning satellite. A modern intercontinental ballistic missile only needs a little over 30 minutes' time from being launched to hitting a target 8,000 to 10,000 kilometers away. However, a missile advance warning satellite, flying at an altitude of more than 30,000 kilometers, in several tens of seconds after a missile is launched can give the surface command center this piece of information, so that the command center can organize an interception or counterattack before the missile lands and explodes.

The advance warning satellites discovers the missile mainly on the basis of the infrared radiation produced at the time of the missile launch. No matter

whether the rocket engine uses liquid fuel or solid pellets as its propellant, the combustion chamber temperature is more than 3,000°C. After being launched, a missile spurts out from its tail assembly a blazing long trail of smoke that produces strong infrared radiation. The electronic components of the advanced warning satellite senses this infrared radiation and immediately sends out electric signals, confirming that a missile has been launched. To get rid of interference from the sunlight's reflection in the upper layers of the atmosphere and from the flames of forest fires and steel mills on the earth, the satellite is equipped with a television camera that pierces the 1.5-kilometer-long smoke trail spurted out by the missile as it bores through the atmospheric layers. The infrared sensing components and the television camera mutually provide evidence and are able fairly accurately to provide relevant information on the oncoming missile.

Since 1971, America has deployed three advance warning satellites in sychronous orbits above the Indian Ocean and the Atlantic Ocean. Ninety seconds after a Soviet missile is launched, they can detect the target and within 3 to 4 minutes send advance warning information to the North American Air Defense Command. It is said that they can provide more than 25 minutes' advance warning time for intercontinental ballistic missiles and 5 to 15 minute's advance warning time for submarine-to-surface missiles. Since being put in service, the U.S. advance warning satellites have detected more than 1,000 missile experiments by the Soviet Union, France, and our country.

b. Chinese-character intelligence terminal. Besides automatic information terminals that need no manual intervention, there are a large number of information terminals of the manual type that are linked to the command center's electronic computer. This type of terminal is usually composed of a typewriter keyboard, a fluorescent screen display unit, and a character printer, and some of them also have a picture input-output device. The commanders of units in different regions can use this type of terminal to make situation reports to the command center and to receive orders from the command center.

In an electronic computer, digits and Englih-language letters are usually used, but our country uses Chinese characters, normally 4,000 to 5,000. Therefore, putting Chinese characters into a computer is a key technological problem in automating our army's command position. The Chinese-character intelligence terminal is the device that solves this key problem (Fig. 9-11). With a microelectronic computer as its core, it is fitted with a Chinese-character keyboard and a Chinese-character printer and display unit. On the display unit the command personnel can directly use Chinese characters to draft messages, and to edit and revise the drafts. And depending on which button is pressed the message that is printed by the Chinese-character printer will immediately and automatically be sent to the receiving unit or stored in the memory. The use of the Chinese-character intelligence terminal will free our army's command personnel from overelaborate manual operations and greatly improve work efficiency.

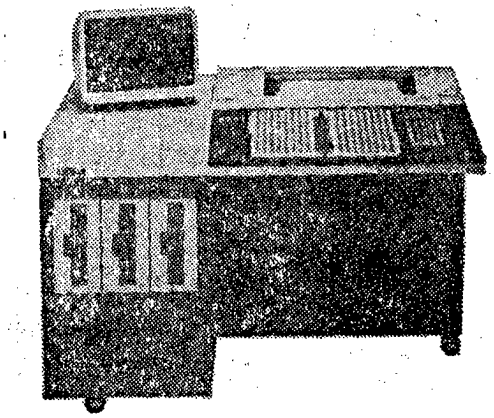

Fig. 9-11.

c. Image processing terminal. The image processing terminal, which is controlled by a microelectronic computer, is a good helper for our command personnel in carrying out a lot of map operations. Possessing many means for graphic input, like a keyboard, input panel, and camera, it is able to put into the electronic computer maps and information on the situation between the enemy and ourselves, and is able to cover a background map with characters, writing, symbols, and so forth; it is also able to store a lot of graphics for reserve use, and at the same time it possesses a transmission function by which it can communicate with and mutually pass on information to electronic computers or graphic terminals in other parts of the country.

d. Big-screen display unit. To provide more command personnel with directly perceived, vivid, and distinct situation information and on-the-spot coverage, there is normally set up in an automated command post a large-screen display unit (Fig. 9-12). It can display the situation between the enemy and ourselves, the locus of flying targets, and various kinds of data tables, supplying the command personnel with them for study and use. For example, the U.S. Strategic Air Command's command post has six 4.8 x 4.8 meter large screens. Of them, four are in seven colors, and can display various kinds of air situations. Some large screens are as big as 6 x 8 meters or 9 x 18 meters, and can simultaneously display the situation in each war zone in the globe.

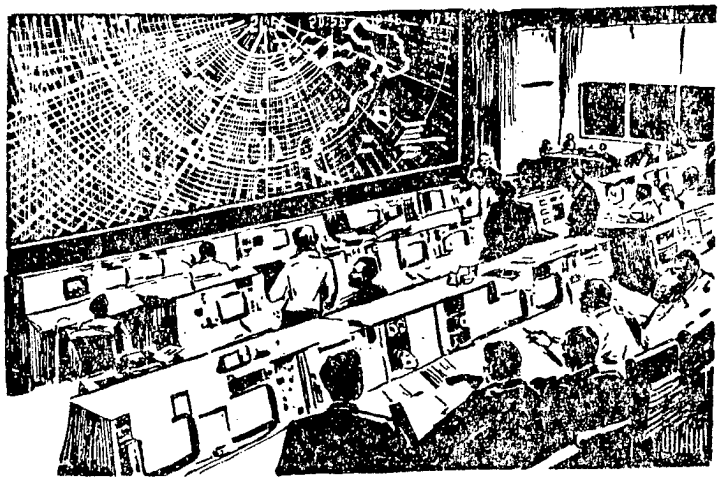

Fig. 9-12.

Above we separately introduced the three component parts of the automated command system: electronic computer, communication network and information terminal. When joined together these three component parts form an integrated automated command system which can accurately and swiftly complete command tasks.

3. Application of Automated Command Systems

The range of application of an automated command system is very wide. Besides being used for operational command, weapon control, combat support, and logistical work, it is also used for personnel training, military scientific research, and administration and management. Of course, it also has wide uses in the civil system, but here we are mainly introducing its operational command and weapon control.

(1) Operational Command

In the previous section, when introducing each part that makes up an automated command system, some relevant operational command aspects were related, and below we will mainly introduce the entire process of operational command automation and the relationship between each link.

The chief mission of operational command is to collect and process information, and this is the first link in operational command. Reconnaissance satellites, reconnaissance aircraft, reconnaissance ships, reconnaissance vehicles, and reconnaissance radar, as well as the other various kinds of information terminals used by the units of all service arms, take from various places various types of military information and continuously and automatically send it to the electronic computer in the command center. The electronic computer accurately and without error analyzes and edits, or stores for future reference, these pieces of information, or separately sends them to the seats of the relevant commanders, where they are timely displayed, allowing the commanders to understand the situation swiftly and comprehensively, thereby creating the conditions for them to make operational decisions.

Besides providing new information, the command post has a large amount of informational data that have been stored up year after year. When dealing with certain problems, the command personnel frequently need to extract needed materials from data banks filed with voluminous information. The work of information searching is also done by the electronic computer. A commander only has to press a button and the material he needs appears on the fluorescent screen before his eyes. If required, the material can be automatically printed. A modern large electronic computer can systematically store military, economic, and political data on all places in the world, and is able at any time to replace and revise the stored information. At the same time, during the process of information processing, the electronic computer is able automatically to encrypt and decipher the information content.

On the basis of mastering a large amount of information, the second stage in operational command is to formulate an operational plan, also called the operational advance plan. Of course the superiority or inferiority of an operational plan is decided by the creativity and thinking of the commander, but the

electronic computer can also play an important role. It not only can help people to formulate the operational plan, but also, based on actual circumstances, can compare various advance plans and swiftly select the optimum plan as a reference for the commander. It can be said to be the commander's "senior staff officer." However, to use the electronic computer to formulate and select the optimum operational plan is not an easy thing. Because the electronic computer is a "computing" machine, it only understands some numbers, diagrams, and symbols, and it can be said to be utterly ignorant about problems of complicated operations. Therefore, some relevant operational problems must be changed into a mathematical problem before the electronic computer can accept and solve it. This requires people to conscientiously study the situation of operational command, make a mathematical model of the operational problem, work out the corresponding applied software, and enter it into the electronic computer, which can then complete the work.

After there is an operational plan, there is the third link in command: assignment of tasks and issuing of orders. Based on the operational plan devised by the electronic computer, the commander makes the final decision. He need only press the right buttons and the operational plan that was decided upon is automatically and swiftly sent through the communications network and displayed on the terminal equipment of each unit that is to execute the orders, and the units accordingly take action.

During the course of a battle, the automated command system is able constantly and comprehensively to analyze materials concerning the enemy's situation, automatically displaying the battlefield situation and the situation in the air, so that the commander understands the changes in the enemy's situation and ours.

For example, when an offensive is begun, materials on the enemy's situation are put into the electronic computer, and if required they can be displayed in written form or on the large screen. The enemy army's battle formations can also be displayed in the form of military unit designations and service arm symbols and signs. During the course of the offensive, the reconnaissance equipment in the air and on the surface constantly sends the information they obtain to the command post; the electronic computer constantly displays the movement of the armed forces on the large screen, and computes the battle areas and times. If it receives reconnaissance information that new enemy units have appeared, this fact is immediately indicated on the screen. On the identical screen the commander can constantly watch the deployment of his side's armed forces and the battle formations. Thus, the commander need not wait for written reports from his subordinates and can swiftly react to changing circumstances.

The process of an integrated operational command is like this diagram (Fig. 9-13). This process of working out procedures, analyzing and judging information, finally making strategic decisions, as well as issuing operational orders is done by the commander or technicians (that is, done by men), and all of the other links are done automatically.

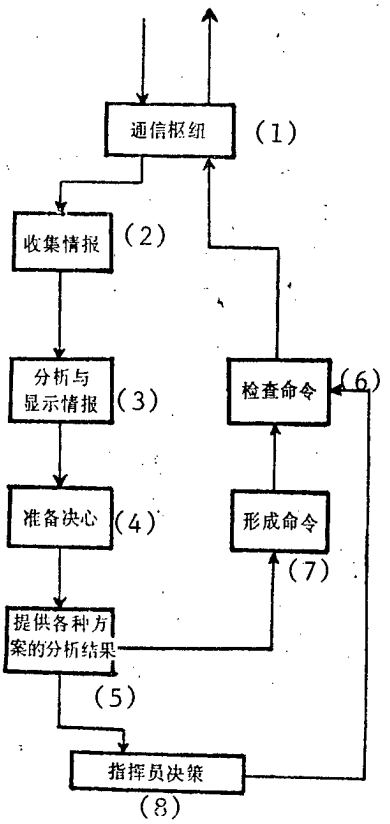

Fig. 9-13. Simplified Flow Chart of Operational Command Information

Key:

1. Communications hub
2. Collect information
3. Analyze and display information
4. Prepare for decision
5. Results of analysis of the various plans provided
6. Inspection of orders
7. Formation of orders
8. Commander's strategic decision

Beginning in the 1980's, America has produced and equipped in succession tactical operational command systems, which are almost able to do all the important work of a commander on a battlefield: for example, collecting, processing, and transmitting relevant information, planning the use of weapons, assessing the results of attacks, and so forth. Command organizations at all levels, from those of group armies to companies, are equipped with this field tactical command system. The headquarters of group armies, armies, and divisions are equipped with mobile computing centers; brigade command posts are equipped with small computers; and there are terminal stations at the battalion and company levels. Liaison is effected between all the above-mentioned levels through a field regional communications network. Results of tests in units of this tactical command system show that it reduces by half the time a battalion uses to report situations to its brigade and division, and one cycle

of a division command post (from a change in the situation to making a decision) is reduced by 1 to 3 hours. Other countries are also developing similar tactical automated command systems.

(2) Weapon Control

During a future war, besides using conventional weapons and conventional forces in conducting operations, guided missile nuclear weapons, this kind of strategic weapon, will probably be used in conducting operations. Operating these weapons is not as simple as using rifles and cannons. For them a large amount of complex data needs to be worked out, and for some of them even an electronic computer must be in operation for several tens of minutes and even several hours. Therefore, they need to be coordinated with an automated weapon control system before they can play their major role.

An automated weapon control system is an important component part of an automated command system. It not only can control many individual strategic weapons, but also can control a complete set of weapon systems including warning equipment, target assignment equipment, guidance equipment, and casualty-producing destructive weapons, so that each stage of command control--from understanding the situation to ascertaining the results of an attack--is automated. Also the entire process can be completed within an extremely short time.

For example, after an advance warning satellite discovers that a missile has been launched, it immediately reports this information to the electronic computer at the command center. When the electronic computer is processing this information, it can automatically distinguish targets and differentiate between the enemy and ourselves, and display the results of its processing on the large screen, reporting to the commander the threat he is confronted with. According to circumstances, the commander will either issue a warning and organize a military-civilian emergency evacuation; or order his side's missiles to take off and intercept the enemy missile; or give tit for tat, "a tooth for a tooth," and "if you hit me with missiles, I'll retaliate with missiles." If the plan to retaliate with missiles is adopted, the commander must first of all select the target to be attacked. However, no matter what target is selected to be attacked, he comes up with an operational plan (temporarily not being able to compute) based on the target and its nature, and the requirements. After the commander selects the target to be attacked, he issues orders based on the operational advance plan, and the operators press buttons and the missile ascends into the sky in a flight toward the target at a preset trajectory.

During the course of the missile's flight, various types of monitoring systems, from beginning to end, follow closely its flight conditions, and whenever necessary they transmit data on its altitude and speed to the command center, where they are displayed on the large screen for the commander's observation and understanding. Finally, when the missile hits the target and the nuclear weapon explodes, the electronic computer immediately computes the result of the strike, so that the commander understands whether the anticipated purpose had been achieved in order to decide the next operational action.

During the course of the entire operation, the operation is basically done by the electronic computer in accordance with the organized procedure, and the command personnel only play a role of making the strategic decision before the weapon is launched.

Even if the automatic command system of the armed forces has many superiorities, in the final analysis it cannot replace the commanding officer's cerebrum. Because it does not have the ability to think, all of its work is done in accordance with the procedures set up in advance by people. It can only display its role within the scope of the plan thought up in advance by people. At the same time, because the two sides in a war are hostile groups that keep secrets from each other, and a myriad changes occur in the twinkling of an eye in the battle situation, the automated command also cannot accurately and without error reflect the situation of the enemy and ourselves. Therefore, during the entire process of command, the commander's subjective dynamic role must be brought into full play. It may be said that automation does not weaken or restrict man's role, but rather imposes higher demands on personnel. A military commander in the future not only must have high military attainments, but also must have abundant knowledge of modern science and technology, particularly knowledge of electronic computer technology and mathematics, before he can be equal to his task.

The building of an automated command system in the armed forces is an extremely complex piece of systems engineering. Because its period of development is long and it involves a large expenditure of funds, in the process of building it attention should be paid to:

a. Strengthening communication automation. Communications are the foundation of military command. Without a modernized, reliable communication system, it would be difficult to set up an automated command system. Therefore, when building an automated command system, the overall situation must be considered, with particular attention paid to the building of the communication system.

b. Strengthening research in the military service of command automation. From the angle of strategy and tactics, we must integrate it with the characteristics of our country's armed forces, study how to apply automation technology in military operations, so that technology and tactics are better integrated. Also, after command automation is achieved, we must find out the changes in the armed forces command organizations and military command procedures and constantly improve them so that they better meet the demands of automation.

c. It must be gradually built from small to big, from lower levels to higher levels, and from part to whole. Provided we follow in order and proceed step by step in this way, we will take fewer detours and avoid waste.

d. Attention must be paid to unified technical systems and standards. During the process of achieving command automation, each service arm will first independently build its own automated command system, after which they will be linked together to form an integrated all-PLA command system, and thus all technical systems and standards must be unified as early as possible, avoiding the creation of difficulties in the future because they cannot be linked up.

e. Technology and people must advance side by side simultaneously. If we have advanced command technical instruments, we are bound to need personnel who possess modern scientific and cultural knowledge and military knowledge. Therefore to develop command automation, technology and people must advance side by side simultaneously. And we need to expend more energy on the development and training of people.

Following the development of science and technology, the automated command systems in the armed forces are developing to a higher level. In technology, attention is paid universally to the application of microcomputer technology, making use of many means of communication like optical waveguide fiber communication and satellite communication and to various types of emergency communication in order to improve communication support capability. In particular, attention is paid to improving the reliability, security, and damage resistance of the systems, and research and development work on destroying the enemy side's automated command systems is being strengthened. In brief, automated command systems are already an indispensable component part of modernized armed forces, and, based on the characteristics of our country and armed forces, we must vigorously begin research and application work on this aspect. Provided we exert ourselves and work hard, supplementing our shortcomings with the strong points of others, we will certainly be able to build automated command systems suited to our army's characteristics.

END

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